THE PAPER INDUSTRY
and PAPER WORLD
AN EDUCATIONAL NEWS MAGAZINE – JANUARY, 1949

TECHNOLOGY DEPARTMENT

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Suction Couch *with* DOUBLE SUCTION BOX

Combines virtues of a wide, low vacuum box and a narrow, high vacuum box in one roll . . . for high speed paper machines.

A Downingtown Suction Couch with a Double Suction Box, one a wide, low or moderate vacuum box, and the other a narrow, high vacuum box, has the following advantages: (1) Maximum water removal at the couch assures safer running thru presses at high speed. (2) Large suction area absorbs carry-overs from the flat boxes and helps prevent them from causing breaks. (3) Vacuum is applied gradually. In many mills, it has been found that if high vacuum is used in a single box, fibres are drawn into the wire, making it difficult to remove the sheet from the couch and sometimes causing picking of holes in the sheet. (4) Double box in one roll means that free air in the holes is not handled twice as would be the case with two rolls. (5) Minimum vacuum equipment and maximum water removal. . . . Write for more information.

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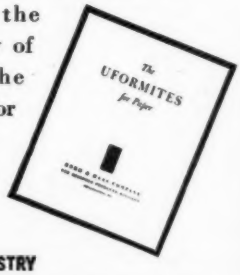

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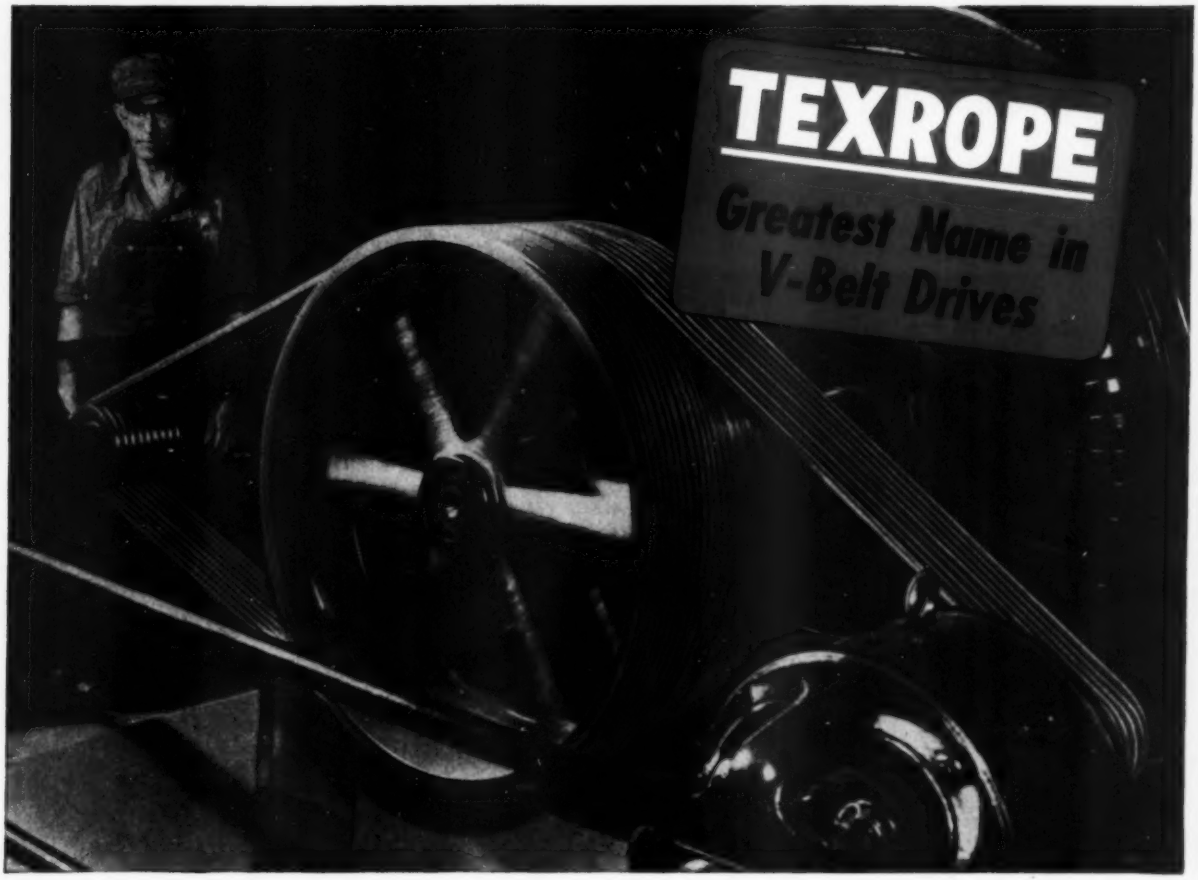

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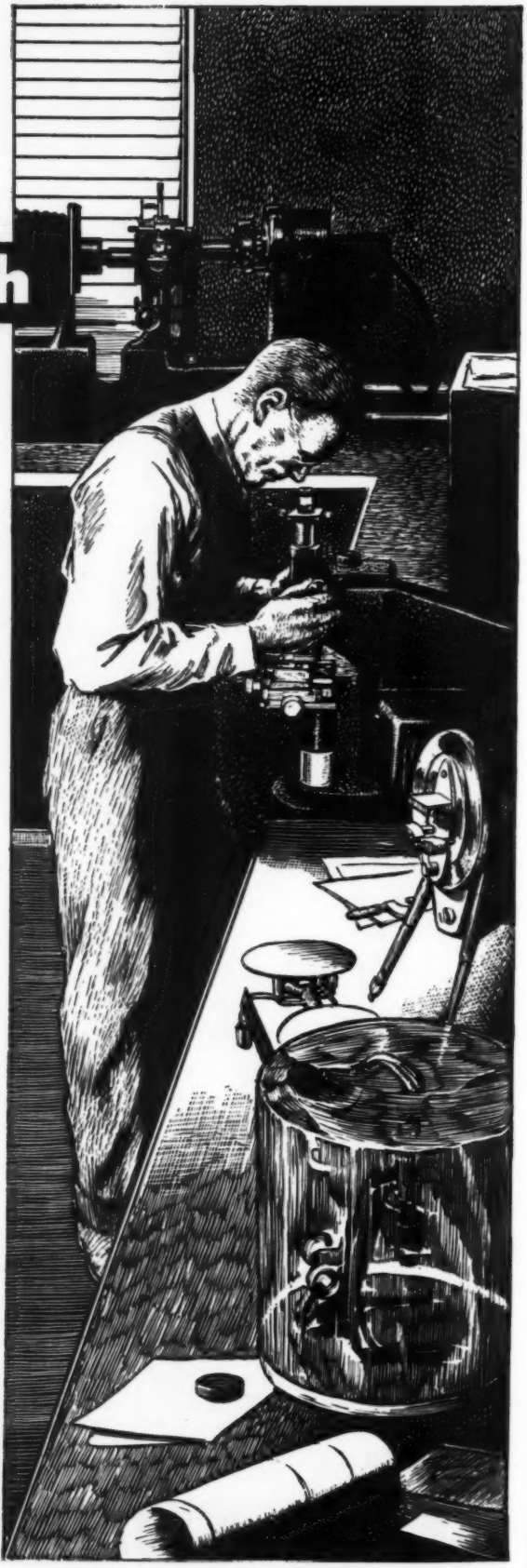

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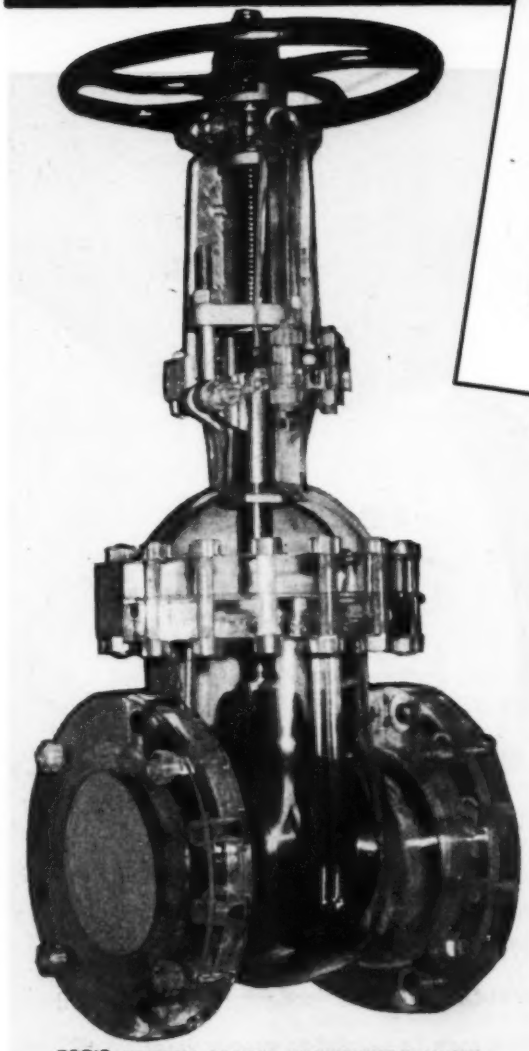

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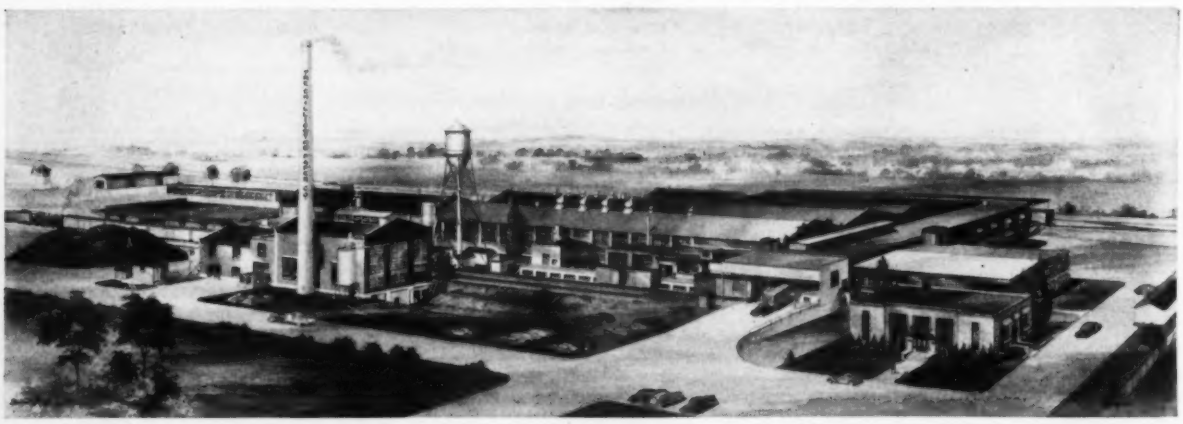

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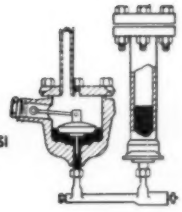

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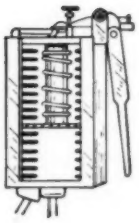

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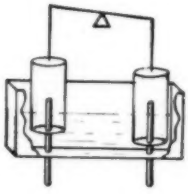

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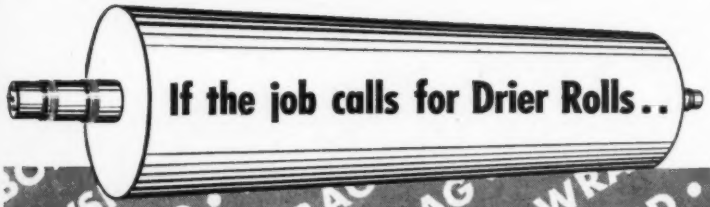

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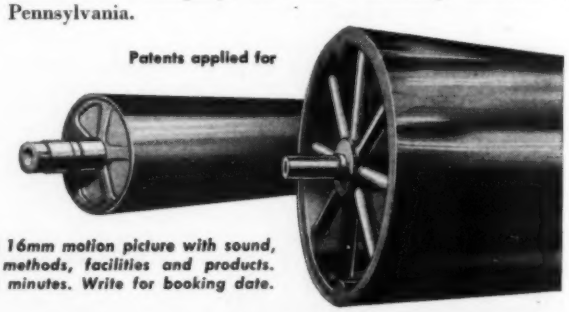

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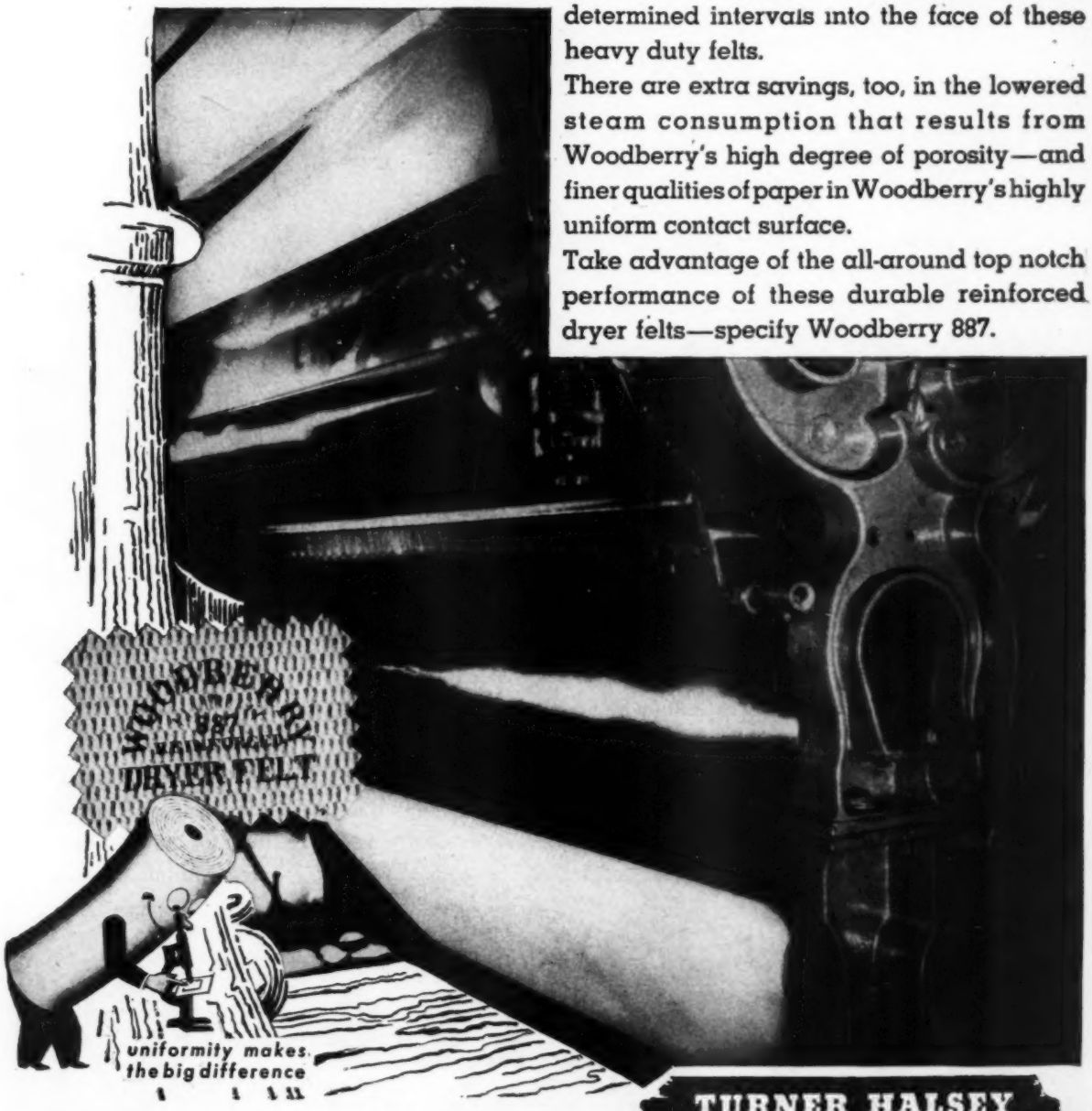

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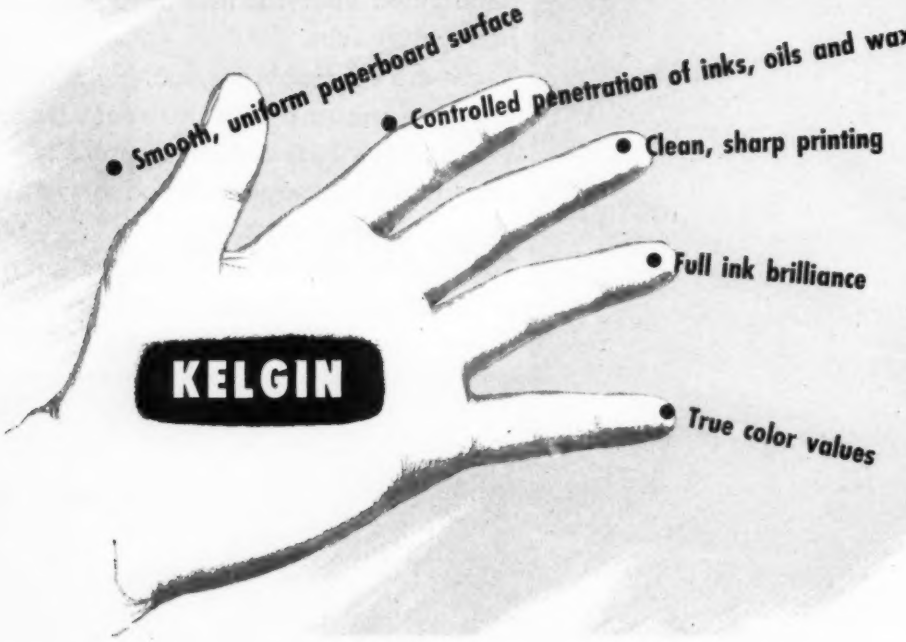
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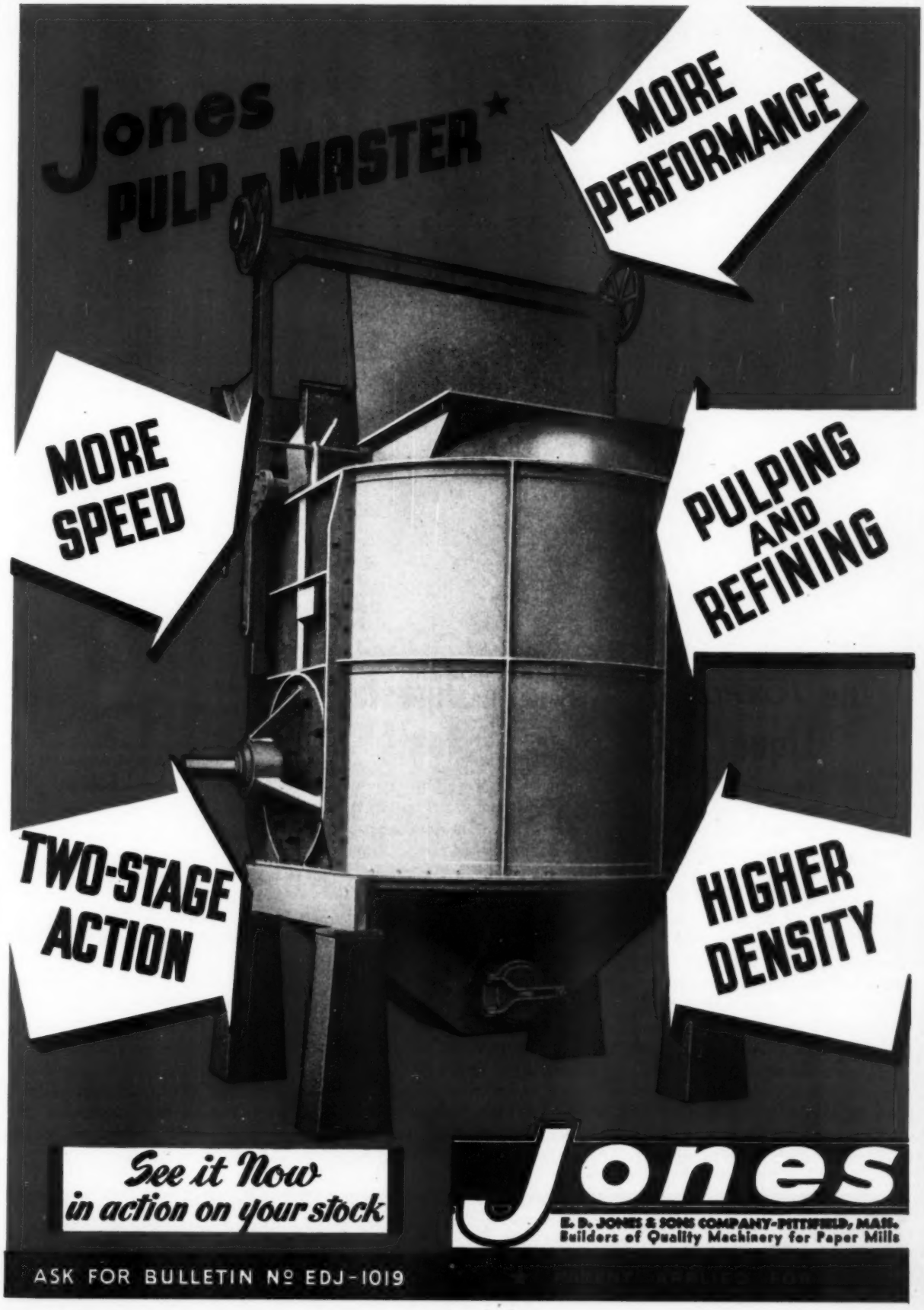
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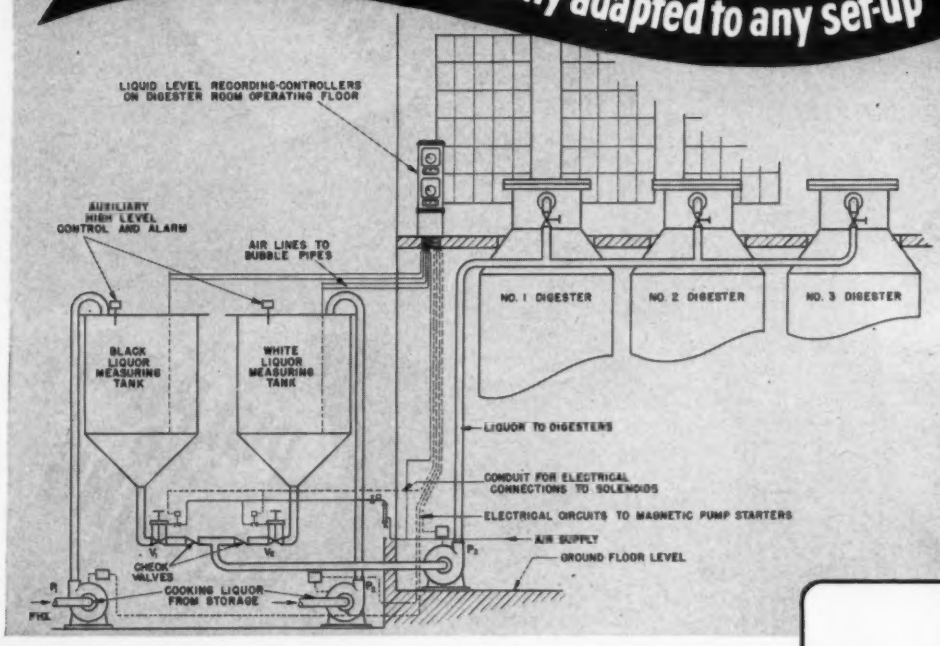
Better Control of Liquor Charges to Digesters... Easily adapted to any set-up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GROUND FLOOR LEVEL
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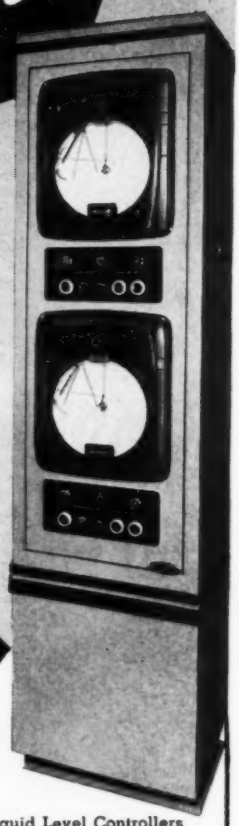
COOKING LIQUOR FROM STORAGE



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- Manual Valve and Pump Control for Emergency Use

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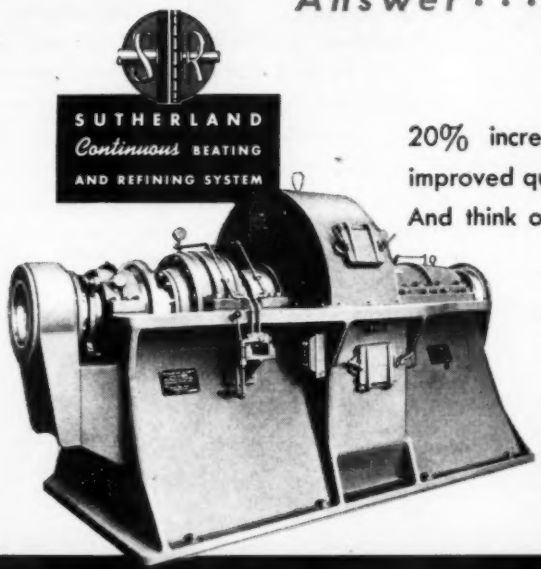

20% increase in yield is a fact, not fiction. So is improved quality resulting from pulp of higher strength. And think of the reduced cost per ton; also the economical utilization of our natural wood resources. Both of these processes are in operation. Write us.

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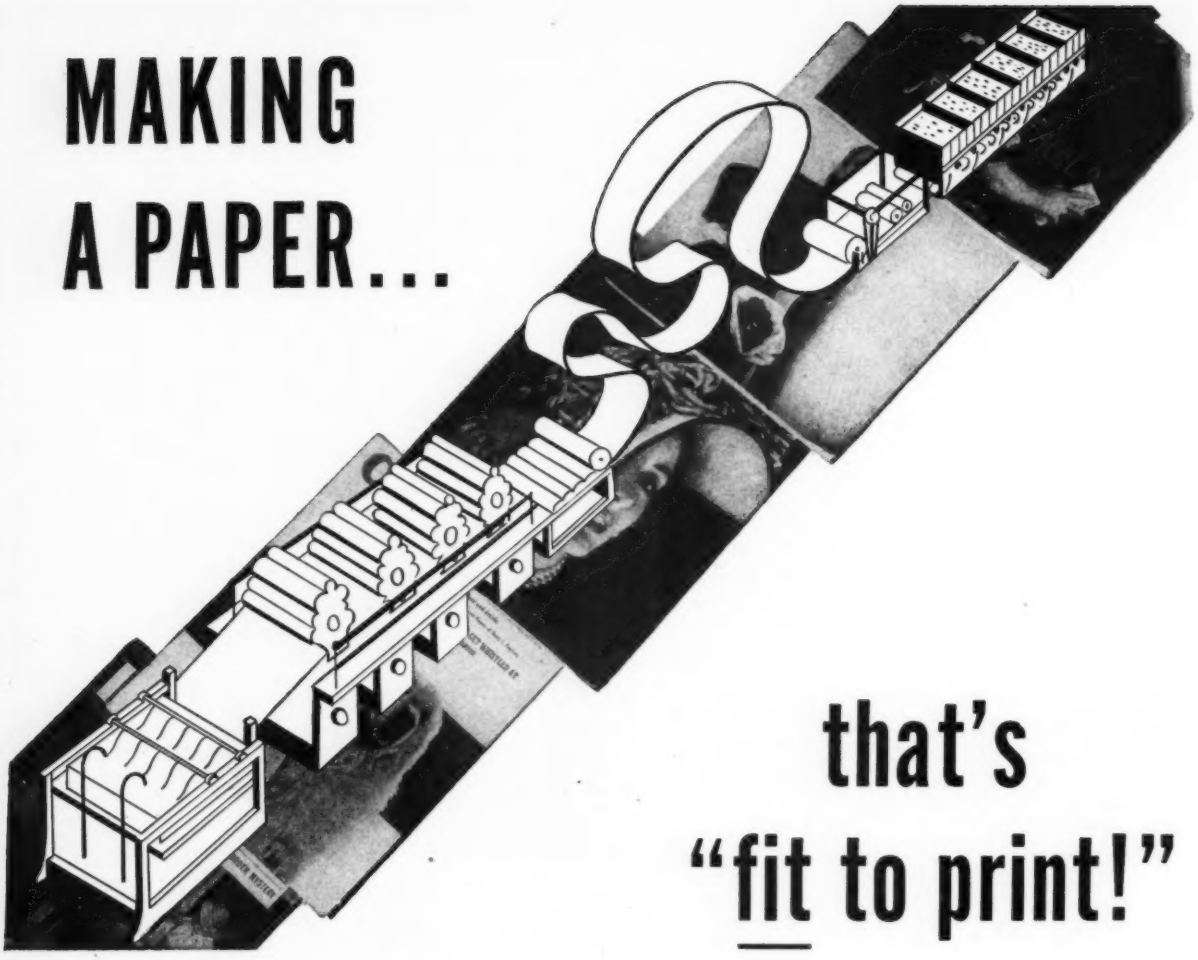
MAKING A PAPER...



that's "fit to print!"

Like the star editor in the publication office, NOPCO KF* —*star "bubble-buster"*—helps the paper manufacturer to make a paper that's fit to print.

NOPCO KF improves sheet formation even at increased machine speeds by eliminating the twin foes of good paper production—excess foam and faulty fiber dispersion. Entrained air — common cause of thin spots — is dissipated as if stock were being handled at slow speeds —because NOPCO KF keeps working on the wire.

***NOPCO KF** provides these 9 advantages.* (1) *one-minute* preparation of KF emulsion . . . (2) *two-minute* dispersion of foam at head-box . . . (3) *five-minute* elimination of bubbles from wire . . . (4) at least *75%* reduction of thin spots . . . (5) production of more paper with fewer clean-ups . . . (6) reduced breaks . . . (7) improved surface characteristics . . . (8) conservation of valuable paper making material . . . (9) greatly increased water repellency.

See what this chemical substance—expressly formulated to aid formation and make paper fit to print—can do in your mill. Order enough for a trial run now.

NOPCO CHEMICAL COMPANY, Harrison, N. J.
Formerly National Oil Products Co.
Branches: BOSTON • CHICAGO • CEDARTOWN, GA. • RICHMOND, CALIF.

NOPCO KF

NOPCO TRADEMARK EVOLVED THRU RESEARCH

SUPER "BUBBLE-BUSTER"

An affiliate of the American Pulp and Paper Mill Superintendents Association

*Reg. U. S. Pat. Off.

MARATHON Speeds PULP PRODUCTION WITH 7 YARWAY DIGESTER VALVES

At this "world's most modern pulp mill" seven Yarway 8-inch Motor-Operated Digester Blow Valves are on the job, discharging the contents of huge digesters through the blow lines into the blow tanks.

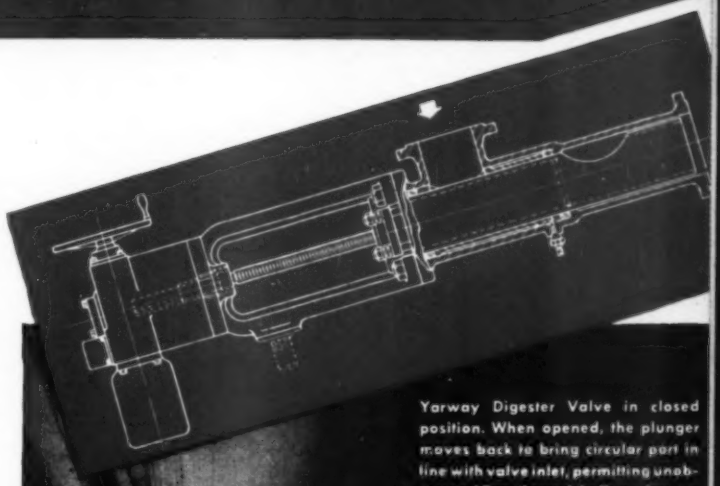
Throughout the paper industry, Yarway Digester Valves are outstandingly successful. The famous Yarway *Seatless* principle, assures a *tight* valve—effectively sealing off the digester, preventing loss of black liquor, increasing number of cooks per day.

Metallurgical advancements permit Yarway Digester Valves to withstand the high pressure, shock and chemical action always encountered in this rigorous service.

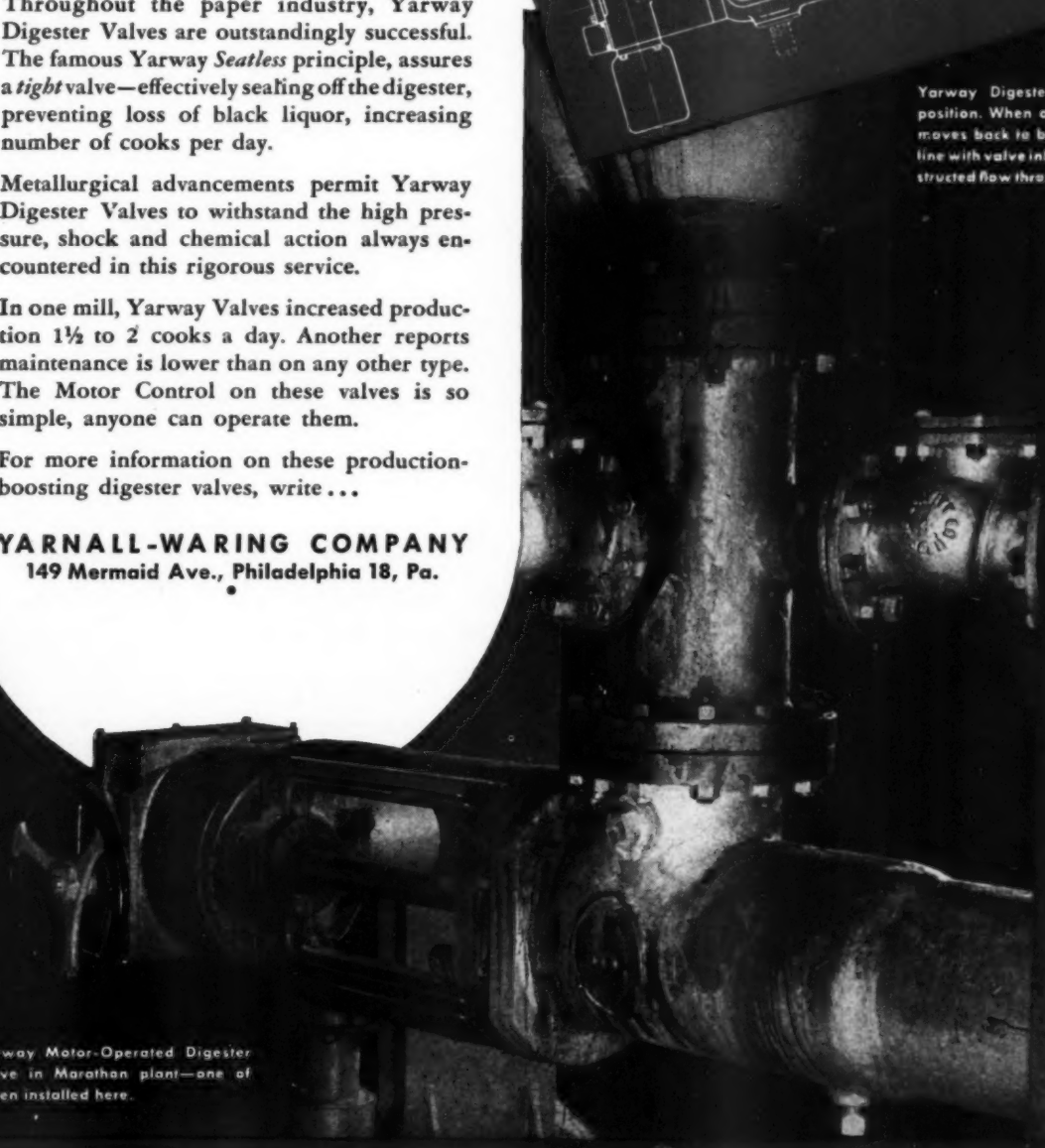
In one mill, Yarway Valves increased production 1½ to 2 cooks a day. Another reports maintenance is lower than on any other type. The Motor Control on these valves is so simple, anyone can operate them.

For more information on these production-boosting digester valves, write . . .

YARNALL-WARING COMPANY
149 Mermaid Ave., Philadelphia 18, Pa.



Yarway Digester Valve in closed position. When opened, the plunger moves back to bring circular port in line with valve inlet, permitting unobstructed flow through hollow plunger.



Yarway Motor-Operated Digester Valve in Marathon plant—one of seven installed here.

YARWAY BLOW-OFF VALVES

PERKINS

Perkins Calender Rolls—the natural result of the longest and broadest experience in the industry give a quality that is definitely reflected in your product. Perkins service includes refills of any make of calender rolls.

B. F. PERKINS & SON, Inc.

ENGINEERS AND MANUFACTURERS

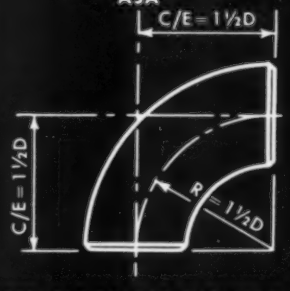
HOLYOKE, MASS.

LARGEST MANUFACTURERS OF CALENDER ROLLS IN THE WORLD

Improvements and economies in welded piping result from this *Variety* of MIDWEST ELBOWS

1

LONG RADIUS ASA

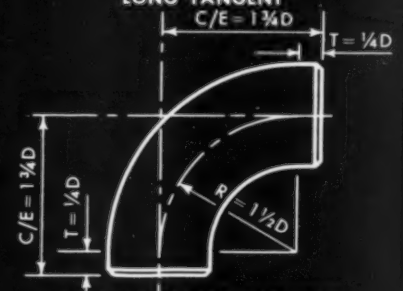


SIZES: ¾" TO 24", INCLUSIVE

Dimensions conform to applicable size range of American Standard for Butt-Welding Fittings, ASA B16.9. Radius and center-to-end dimension equal 1½ times nominal pipe size.

2

LONG RADIUS LONG TANGENT

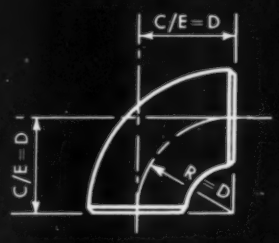


SIZES: 2" TO 20", INCLUSIVE

Same radius as ASA Elbows but with long integral tangent on each end — an exclusive Midwest feature that saves time and pipe. No price increase over ASA Elbows.

3

SHORT RADIUS

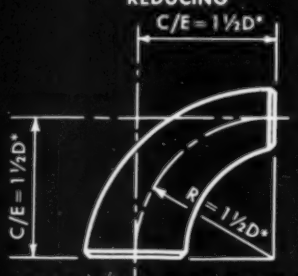


SIZES: 1" TO 30", INCLUSIVE

Where space limitations prevent use of ASA Elbows or Midwest "Long Tangent" Elbows shown above at right, these short turn elbows without tangents are recommended.

4

LONG RADIUS REDUCING



SIZES: 2" TO 12"*, INCLUSIVE

Midwest Reducing Elbow takes the place of a straight elbow and a reducer. It saves more than one-third of the welding and improves both design and appearance.

SYMBOLS { *C/E—Center-to-End Dimension; T—Length of Tangent; D—Nominal Pipe Size; R—Radius; *D—Dimension is for larger Pipe Size*

The *variety* of Midwest Welding Elbows is particularly important because of the exceptional latitude in design and economy in erection that it provides. For example, the Midwest Long Tangent Elbow permits faster, easier, more accurate lining up with pipe . . . removes weld from point of maximum bending stress . . . often eliminates a short nipple and its extra weld. Slip-on flanges are easily used with minimum change in flange and fitting.

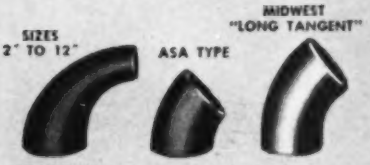
This "Variety" is only one of several reasons why many users prefer Midwest Welding Elbows.

Only MIDWEST offers this VARIETY

MIDWEST WELDING FITTINGS

Improve Piping Designs and Reduce Costs

90° ELBOWS



REDUCING 90° ELBOWS

45° ELBOWS

LAP-JOINT STUB ENDS

REDUCERS

CAPS

SADDLES

SLEEVES

RETURN BENDS

TEES

LATERALS

CROSSES

REDUCING-ON-RUN TEES

SHAPED NIPPLES

FLANGES

MIDWEST PIPING & SUPPLY CO., Inc.

Main Offices: 1450 South Second Street, St. Louis (4), Mo.

Sales Offices: New York (7), 30 Church St.

Chicago (3), 79 West Monroe St. • Los Angeles (33), 520 Anderson St. • Houston (2), 229 Shell Bldg. • Tulsa (3), 533 Mayo Bldg. South Boston (27), 426 First St. • Distributors in Principal Cities.

—AND HERE'S ANOTHER "FIRST" BY DODGE!

Here is another Dodge development which simplifies and improves power transmission machinery... the Rolling Grip Clutch. Toggles are *eliminated* by employment of ball and wedge principle.

Heavy power-transmitting pressure on the friction disc is developed by a circle of hardened steel balls which are forced into a wedge-shaped groove by the sliding cam.

The "wedge" of cam and groove contours multiplies the force exerted on the shifter collar into a powerful force on the friction disc.

Engagement is easy and positive —smooth as a rolling ball. Great flexibility, ease of control and extreme ruggedness are provided in this modern, compact unit.

Available in Bolted Plate or Gear Tooth Plate series—in sizes from .38 H.P. to 21.2 H.P. at 100 R.P.M. Write for special bulletin, A282.

DODGE MANUFACTURING CORPORATION
Mishawaka, Indiana

ROLLING GRIP CLUTCH

DODGE
of Mishawaka, Ind.

CALL THE TRANSMISSIONEER

He is your local Dodge Distributor—factory trained—qualified to suggest ways to improve your machine performance, increase production. Look for his name under "Power Transmission Equipment" in your classified phone book.

Copyright, 1948, Dodge Mfg. Corp.

FOR YOUR NAME PLATE REQUIREMENTS, WRITE OUR SUBSIDIARY,
ETCHING COMPANY OF AMERICA, 1520 MONTANA STREET, CHICAGO 14, ILLINOIS

Your Choice of Chemicals COUNTS!

In almost every step of paper manufacture from the preparation of pulp to the sizing, filling, and coating of the finished sheet, chemicals are indispensable and must be chosen with exacting care. Paper makers who want to be sure of the quality and uniformity of the alum, salt cake, and other process chemicals they use, specify "General Chemical."

ALUMINUM SULFATE

Standard: Lump; Ground, 99% thru 8 mesh, 95% thru 10 mesh; Powdered, 95% thru 100 mesh.

Iron Free: Lump, approx. 2½"; Ground, thru 8 mesh.
Liquid

SODIUM SULFATE

(Salt Cake) . . . Paper Makers' Grade, thru 8 mesh.

OTHER PRODUCTS OF GENERAL CHEMICAL FOR THE PAPER INDUSTRY

- Glauber's Salt (Crystal and Anhydrous)
- Sulfuric Acid
- Sodium Hyposulfite
- Sodium Sulfite (Anhydrous)
- Sodium Silicate
- Chromium Potassium Sulfate (Potash Chrome Alum)
- Aqua Ammonia
- Sodium Fluoride
- Tetrasodium Pyrophosphate (Anhydrous)
- Sodium Bisulfite (Anhydrous)
- Nitric Acid
- Sodium Sulfide
- Hydrochloric Acid
- Sodium Metasilicate
- Trisodium Phosphate
- Copper Sulfate
- Disodium Phosphate (Anhydrous)

BASIC CHEMICALS

GC

FOR AMERICAN INDUSTRY

GENERAL CHEMICAL DIVISION
ALLIED CHEMICAL & DYE CORPORATION
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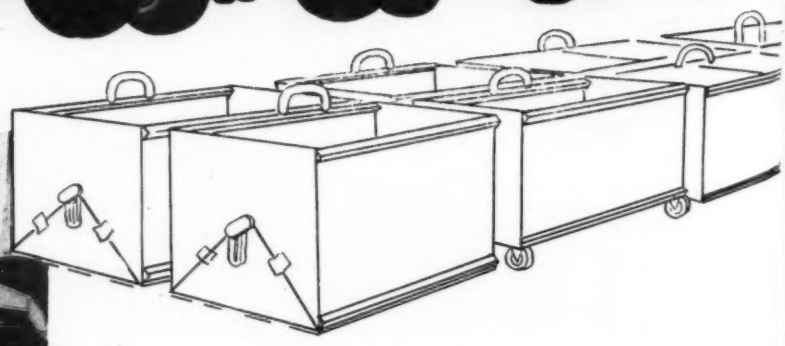
THESE FOUR TRUCKS HANDLE 88 CONTAINERS OF 15 DIFFERENT TYPES



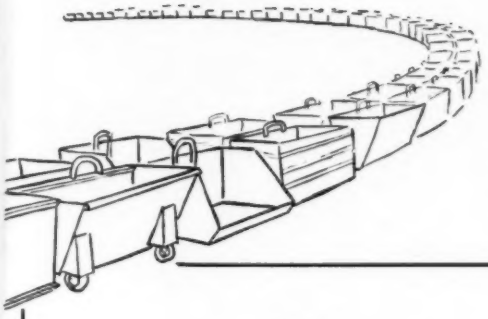
Like many industrial operations, this refinery extends over many acres and handles great quantities of materials, in addition to hundreds of cubic yards of scrap and rubbish daily. Choosing strategic points for receiving material, the 88 containers were placed throughout the refinery, the requirements at each point determining the size and number of containers to be used. At some points for liquid, water-tight containers with lids were required. At others, light, bulky waste called for a big capacity, light-weight enclosed container. Some accumulation points were inside buildings. Containers on casters that could easily be rolled indoors were provided. Each container is assigned to one of the four truck hoisting units and, on a synchronized schedule, is picked up as soon as it is filled. Photos at left show: top-truck hoisting unit backing up to a 6 cu. yd. Universal container. The driver attaches two chains, and then, from controls in the cab, the container is hydraulically lifted into carrying position (see photo at left center). Arriving at the disposal area, the container is automatically dumped (see photo left below). The container is then returned to its original point for reloading and the truck hoisting unit moves on to the next container on its route. Pick-up and dumping operations require only a matter of seconds, thus it is possible for one man and one truck to handle any number of containers, keeping a steady flow of material moving without waiting or wasting time.

On opposite page are illustrated the types of containers in the original installation and the materials they handle. Note how easily the basic Dempster-Dumpster containers are converted for special purposes by the simple addition of lids, casters or some other special change.

The Dempster-Dumpster system is saving money in large and small plants alike. Its great flexibility makes it adaptable to any plant, regardless of size, and assures tremendous savings along with amazing improvements in efficiency. A survey of your plant, without charge or obligation, could reveal the amazing effectiveness of the Dempster-Dumpster System.

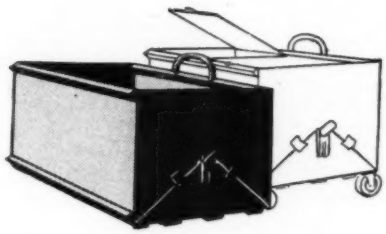
DEMPSTER BROTHERS, Inc.

. . . THIS IS THE DEMPSTER-DUMPSTER SYSTEM
. . . SAVES THIS REFINERY $58,000 ANNUALLY

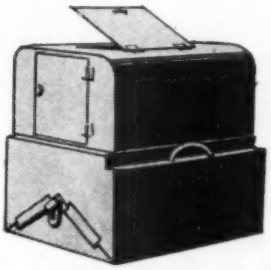


The Dempster-Dumpster System of Materials Handling, simply stated, permits the use of any required number of detachable containers, of various designs and capacities, to be serviced by a single truck. Its ability to effect tremendous savings in handling numerous types of materials has been definitely established in hundreds of leading industrial plants.

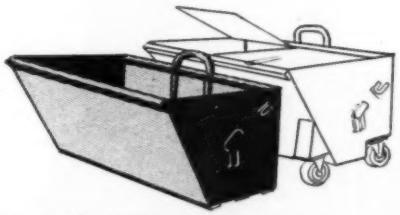
In this particular case, in a large refinery, four of the twelve trucks formerly detailed for materials handling, including scrap and rubbish collection, were equipped with Dempster-Dumpster Hoisting units to handle 88 detachable containers of 15 different types. The Dempster-Dumpster System of quick pick-up and dumping of pre-loaded containers has worked wonders in efficiency, plant appearance, and savings. In one year savings of over $58,000 was shown by our engineers survey. Time has proved the correctness of this survey. Since the original order of 88 containers, so many more uses for the equipment and greater savings were discovered that 55 additional containers have been placed in service with a grand total of 143 containers now being handled by the four trucks.



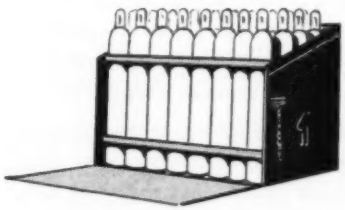
DROP BOTTOM CONTAINERS. 48 drop-bottom containers were furnished for handling trash and rubbish, steel turnings, scrap metal, tube ends and clay:—Twenty 6 cu. yd. open top type, one 6 cu. yd. with lids, nine 2½ cu. yd. open top type, two 2½ cu. yd. open top with casters, six 3 cu. yd. open top, nine 4 cu. yd. with lids, one 4 cu. yd. enclosed with hinged door in top.



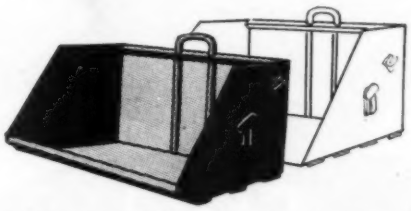
UNIVERSAL CONTAINERS. 13 universal containers were furnished for handling trash and rubbish. Universal containers feature completely enclosed construction, drop-bottom dumping, a door in either end for ground-level loading and a lid in the top for loading from a platform.



TILT TYPE CONTAINERS. 16 tilt type containers were furnished for handling general refuse, sludge and settlings:—Four 3 cu. yd. open top type, nine 3 cu. yd. with lids, three 3 cu. yd. with lids and casters.



SPECIAL CONTAINERS. 3 special containers were furnished for handling and transporting oxygen cylinders from one point to another in the refinery. This container is typical of the many highly specialized uses for which Dempster-Dumpster containers are constructed. Many other containers are available for handling almost any type of material known, be they liquid, dust, light or bulky or very heavy materials.



SKIP TYPE CONTAINERS. 7 skip type containers were furnished for handling refuse wax, oil, lube and coal:—Three 3 cu. yd. skip type with lid, three 3 cu. yd. skip type without lid, one 3 cu. yd. skip type with teeth.

DEMPSTER DUMPSTER
TRADE MARK REG.
SYSTEM

719 Dempster Bldg., Knoxville 17, Tennessee

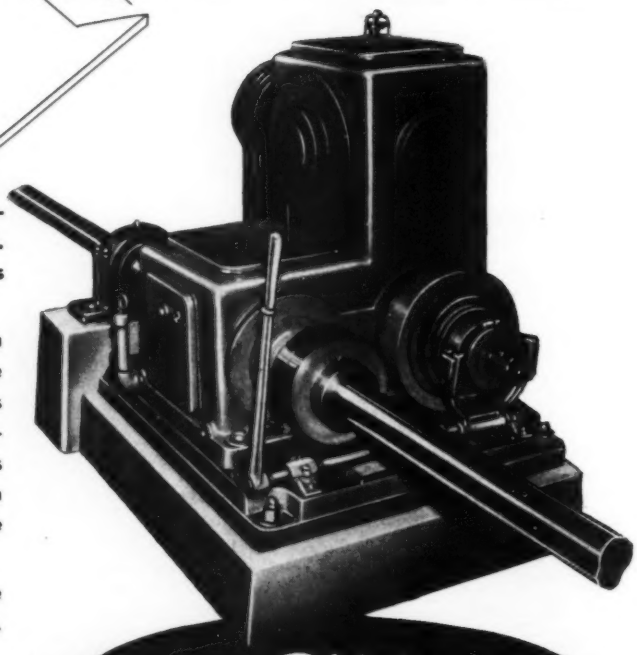
Installation of SYCO Drives has helped to increase paper output on each installation. SYCO contributes to quality control because it is smooth running . . . all the draws stay put.

The precise control mechanism of the modern SYCO Paper Machine Drive facilitates quick, close adjustment of sectional speed . . . then maintains the selected speed without departure. SYCO's interlocking synchronization holds the individual sections in precise speed ratio — preserving uniform tension on the sheet at all times. Breaks are fewer — the machine stays in production with less time out.

SYCO's exact speed control is matched by the ruggedness of its soundly engineered mechanism. SYCO is built for long trouble-free life.

The compact, self-contained modern SYCO drive requires less space, permitting clean, accessible uncluttered space around the machine.

Can the Modern SYCO Paper Machine Drive earn dividends in *your* mill? Write us for full details!



SYCO
MANUFACTURING CORPORATION
Syracuse, N. Y.

206 TIMKEN® BEARINGS

Help Keep Paper Machine Drive Driving

This photograph was made looking toward the dry end of a 134" paper machine built by The Sandy Hill Iron & Brass Works, Hudson Falls, New York.

The drive installation comprises: 4, 20" hypoid double reduction gear drives (28 Timken bearings) 6, 20" hypoid single reduction gear drives (30 Timken bearings) 4, 14" hypoid single reduction gear drives (20 Timken bearings) 14 pulley shafts (56 Timken bearings) 14 belt tighteners (28 Timken bearings) 44 line shaft pillow blocks (44 double Timken bearings).

That makes a total of 206 Timken tapered roller bearings — definite assurance of friction-free, dependable, enduring performance at consistently low cost for operation and maintenance.

Like The Sandy Hill Iron & Brass Works, thousands of other manufacturers in all divisions of industry have found in Timken bearings a sure way to make good machines better machines and *better selling* machines; for Timken bearings are known and preferred the world over — wherever wheels and shafts turn. Make sure you have them in the equipment you build or buy. And look for the trade-mark "TIMKEN" on every bearing. The Timken Roller Bearing Company, Canton 6, Ohio. Cable address "TIMROSCO".

TIMKEN
TAPERED ROLLER BEARINGS

NOT JUST A BALL ○ NOT JUST A ROLLER ▭ THE TIMKEN TAPERED ROLLER ▭ BEARING TAKES RADIAL ◫ AND THRUST —◫— LOADS OR ANY COMBINATION ✳

These LIFE TESTS *prove:*

THE VALUE OF MONEL-CLAD STEEL HERE

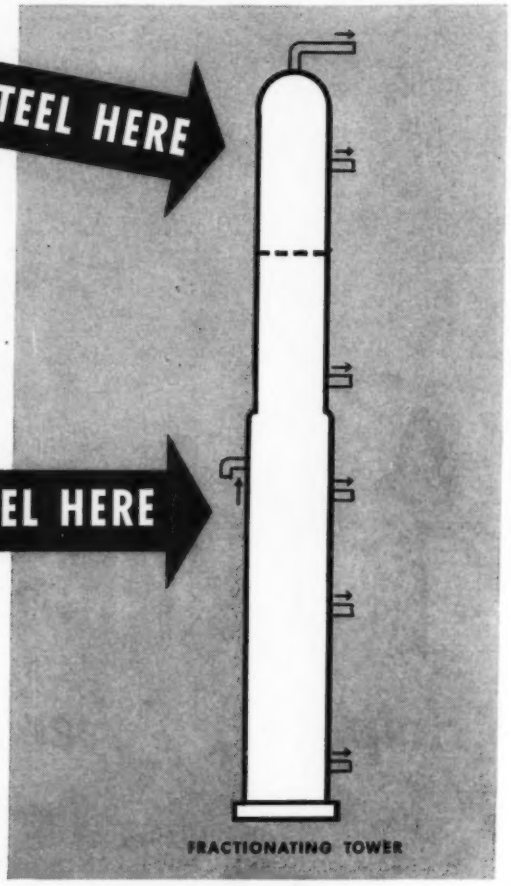
PLANT CORROSION TESTS* IN TOP OF CRUDE TOPPING TOWER	
Material	Corrosion rate, inch penetration per year
Monel	0.003
Nickel	0.006†
Inconel	0.017†
18-8 Mo stainless steel (type 316)	0.053†
18-8 stainless steel (type 304)	Completely corroded away

*In straight run gasoline vapor in top of tower. Average temperature 250° F. Duration of test, 60 days. West Texas crude.
†These materials suffered pitting attack.

AND OF STAINLESS-CLAD STEEL HERE

PLANT CORROSION TESTS* IN BOTTOM OF CRUDE TOPPING TOWER	
Material	Corrosion rate, inch penetration per year
Monel	0.17
Nickel	Completely corroded away
Inconel	0.0002
18-8 Mo stainless steel (type 316)	Less than 0.0001
13 percent Cr steel (type 410)	0.0014

*At bottom of crude fractionating tower, approximately 5" above tray No. 38 near the overflow side. Average temperature 700° F. Duration of test 120 days. East Texas crude. 88 gal. per hr. Na_2CO_3 injected into crude feed.



FRACTIONATING TOWER

Consider, first, the materials promising long life on your equipment; tests like these tell you that. Then weigh comparative cost figures, fabricating characteristics and any other factors involved. You find a safe and economical answer—the Lukens Clad Steel best meeting your requirements.

Life of equipment is lengthened many times, reducing depreciation to a fraction. Maintenance costs are held to a minimum. Equipment is kept in service without interruption. Safe operation is assured. Think what all these advantages add up to!

Lukens makes the most complete range of clad steels available from any source; Nickel-Clad, Stainless-Clad, Inconel-Clad and Monel-Clad Steels, in plates as wide as 178 inches or to over 3 inches thick. Each has a uniform cladding of the corrosion-resistant metal permanently bonded to the steel backing plate. All are available in the extra-smooth sodium hydride finish.

Bulletins 255 and 338 describe these Lukens Clad Steels. For copies, write Lukens Steel Company, 408 Lukens Building, Coatesville, Pennsylvania.

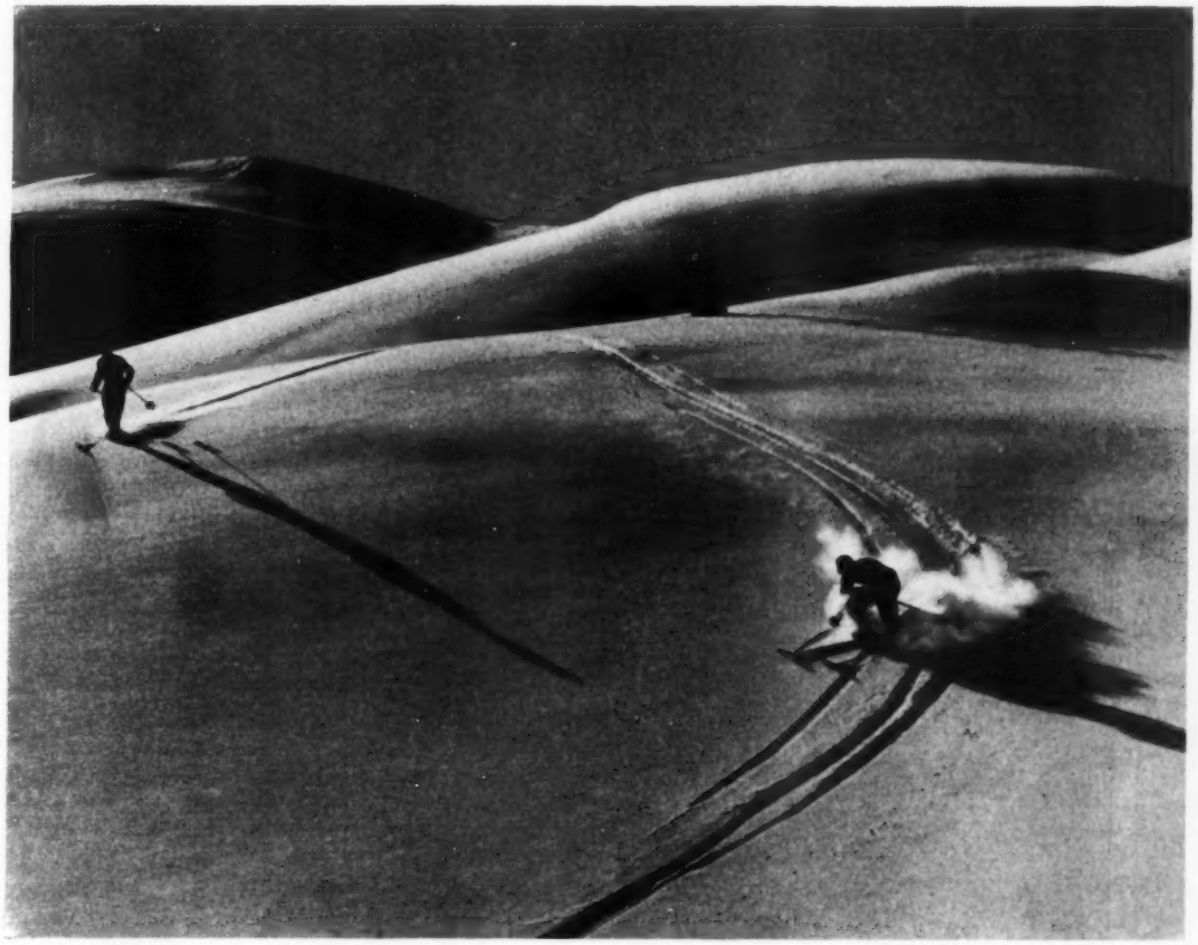
LUKENS
Nickel-Clad Stainless-Clad
Inconel-Clad Monel-Clad
STEELS

Two 16mm Kodachrome motion pictures—"The Manufacture of Lukens Clad Steels" (silent) and "Solving Corrosion Problems" (with sound)—will be loaned to you. Write for booking date.

SOLID METAL ADVANTAGES WITH CLAD STEEL ECONOMY

• • SPEED SCRAP TO THE MILLS TO MAKE MORE STEEL • •

SMOOTHNESS



IN HIGH-GRADE coated paper, too, smoothness is essential. This quality is assured when the paper-coating pigment used is Wyandotte Precipitated Calcium Carbonate.

Wyandotte Precipitated Calcium Carbonate is a highly refined chemical—free from grit and abrasiveness. It is high in opacity and covering power but low in alkalinity. Satisfied users of this quality product like its uniformity and exceptional brightness.

We have recently expanded our production facilities to meet the growing demand for Precipitated Calcium Carbonate.

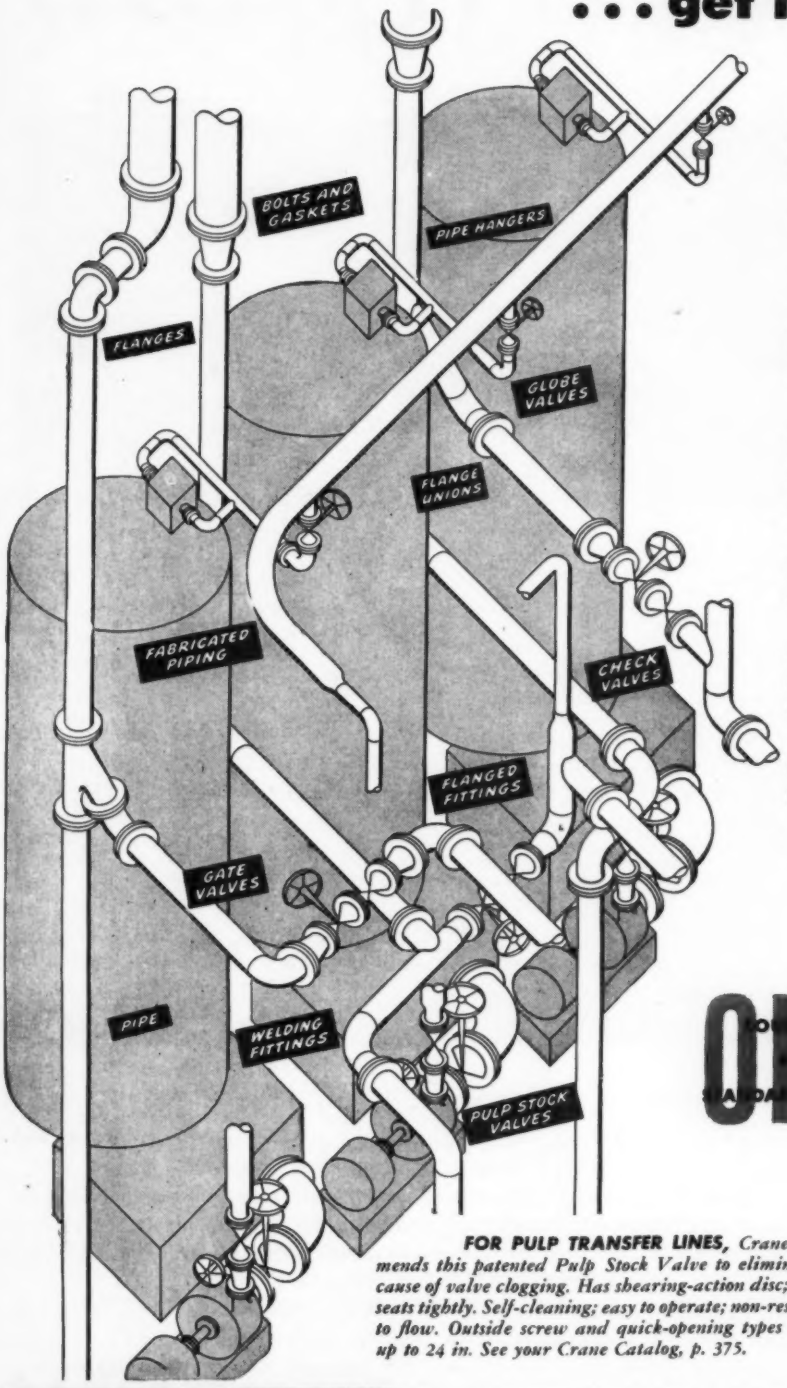
If you are looking for a truly fine paper-coating pigment, we'll be glad to furnish you with samples and technical data.

WYANDOTTE CHEMICALS CORPORATION
WYANDOTTE, MICHIGAN • OFFICES IN PRINCIPAL CITIES

Wyandotte
REG. U. S. PAT. OFF.

Soda Ash • Caustic Soda • Bicarbonate of Soda • Calcium Carbonate • Calcium Chloride • Chlorine • Hydrogen • Dry Ice • Synthetic Detergents
Glycols • Ethylene Dichloride • Propylene Dichloride • Chloroethers • Aromatic Sulfonic Acid Derivatives • Other Organic and Inorganic Chemicals

For widest choice of piping equipment ... get it from CRANE!



Take a bleach plant, or beater room, or boiler house for example. All the piping equipment for these or any paper mill installation can be had from Crane: valves, fittings, pipe line accessories, and pipe—in brass, iron, steel, or alloys.

Complete selection is but one reason why so many mills standardize on the Crane line. It's just one feature of the 3-way advantage of getting everything in piping from Crane.

ONE SOURCE OF SUPPLY helps to simplify all piping procedures—from specifying and ordering, to erection and maintenance. One catalog and one order cover everything for the job.

ONE RESPONSIBILITY for materials helps to get the best installation and to avoid needless delays.

OUTSTANDING QUALITY in every item from Crane means uniform efficiency and dependability in every part of piping systems.

Your local Crane Branch or Wholesaler is amply stocked to give you these piping advantages today.

CRANE CO., *General Offices:*
836 S. Michigan Ave., Chicago 5, Ill.
Branches and Wholesalers
Serving All Industrial Areas

ONE
SOURCE OF SUPPLY
RESPONSIBILITY
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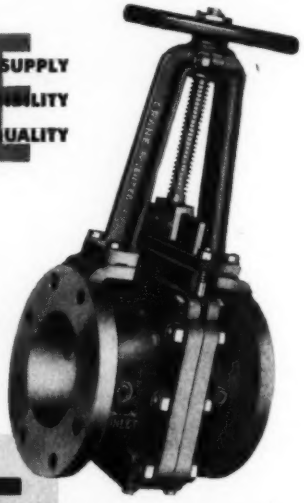

FOR PULP TRANSFER LINES, *Crane recommends this patented Pulp Stock Valve to eliminate the cause of valve clogging. Has shearing-action disc; always seats tightly. Self-cleaning; easy to operate; non-restricting to flow. Outside screw and quick-opening types in sizes up to 24 in. See your Crane Catalog, p. 375.*

EVERYTHING FROM ...

VALVES • FITTINGS
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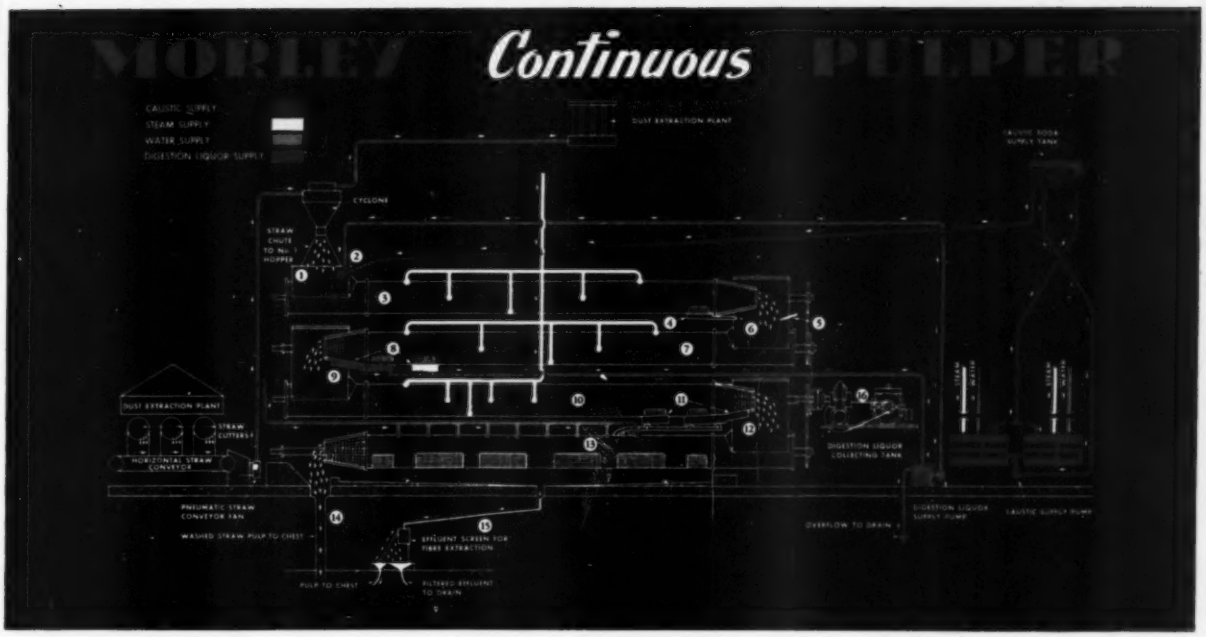
CRANE

FOR EVERY PIPING SYSTEM

MORLEY Continuous PULPER



PATENTED AND PATENTS APPLIED FOR

for continuous pulping of Cereal Straws, Bagasse, and the like

The MORLEY CONTINUOUS PROCESS AND APPARATUS, now in mill operation for five years, is a proven efficient method, operating at atmospheric pressure only. It economically and continuously processes cereal straws and other cellulosic materials to pulp for the ultimate manufacture of quality Paper and/or board, for example: .009 Corrugated, Tube Stock, Wall Board, and many grades requiring rigid characteristics.

- Continuous Feed and Digestion at high density.
- Operates at atmospheric pressure and low temperature.
- For .009 corrugating and board grades, average yields 69-70% based on straw, as used, averaging 12% moisture.
- Low steam consumption.
- Low overall power consumption.
- Digestion period is approximately 20 minutes for .009 corrugating or board grades. This insures minimum degradation of finer fibres, and reduces shrinkage.
- Space required for one 50-ton Unit is 7,000 cubic feet, a saving of approximately 65% over conventional equipment.

Write for Morley Brochure

KEY TO FLOW DIAGRAM:

1 No. 1 Tube Hopper
2 Caustic Soda Orifice metering system
3 No. 1 Tube Impregnator
4 Screen Plate and Drainage Line for Digestion Liquor to No. 2 Tube
5 Recording Thermometer
6 No. 2 Tube Hopper
7 No. 2 Tube Digester
8 Screen Plates and Drainage Line for Digestion Liquor to Collecting Tank
9 No. 3 Tube Hopper
10 No. 3 Tube Digester
11 Screen Plates and Drainage Line for Spent Liquor to Drain
12 No. 4 Tube Hopper
13 No. 4 Tube Washer
14 Washed Straw Pulp to Chest
15 Spent Liquor Supply to Effluent Screen
16 Motor, Texrope, and Reduction Gear Drives

PAPER and INDUSTRIAL APPLIANCES, INC.
122 EAST 42nd STREET NEW YORK, N. Y.

Said the engineer to the president

Low Maintenance Cost
Low Installation Cost
The Most Advanced Welding Process

that's why I'm specifying

Trentweld
Vanstoned Stainless Steel *Tubing*

Apply these facts to your mill and you're money ahead in many ways. For example, Trentweld stainless tubing will outlast ordinary pipe by many years. In terms of eliminated down time for repairs and replacement of lines, this is a dollar saving of major importance. Yet you needn't wait years to enjoy advantages like this. Right from the start Trentweld tubing saves money. Being light-in-weight there is no need for the expensive rigging required by conventional pipe. Even more, Trentweld tubing can be shipped from the mill cold flanged at both ends for vanstoned joints, providing a pipe line that can be assembled easily in record time by your own crew. And lastly, Trentweld is rolled and machine welded by an exclusive process that makes it tougher, structurally stronger — the best of all stainless steel tubing.

Why not investigate this work-horse tubing as so many cost-conscious mills have already done. Call on Trentweld engineers without obligation for specific information on process lines of all types from ⅜" to 30" diameters. Write, too, for the Trentweld Data Bulletin.

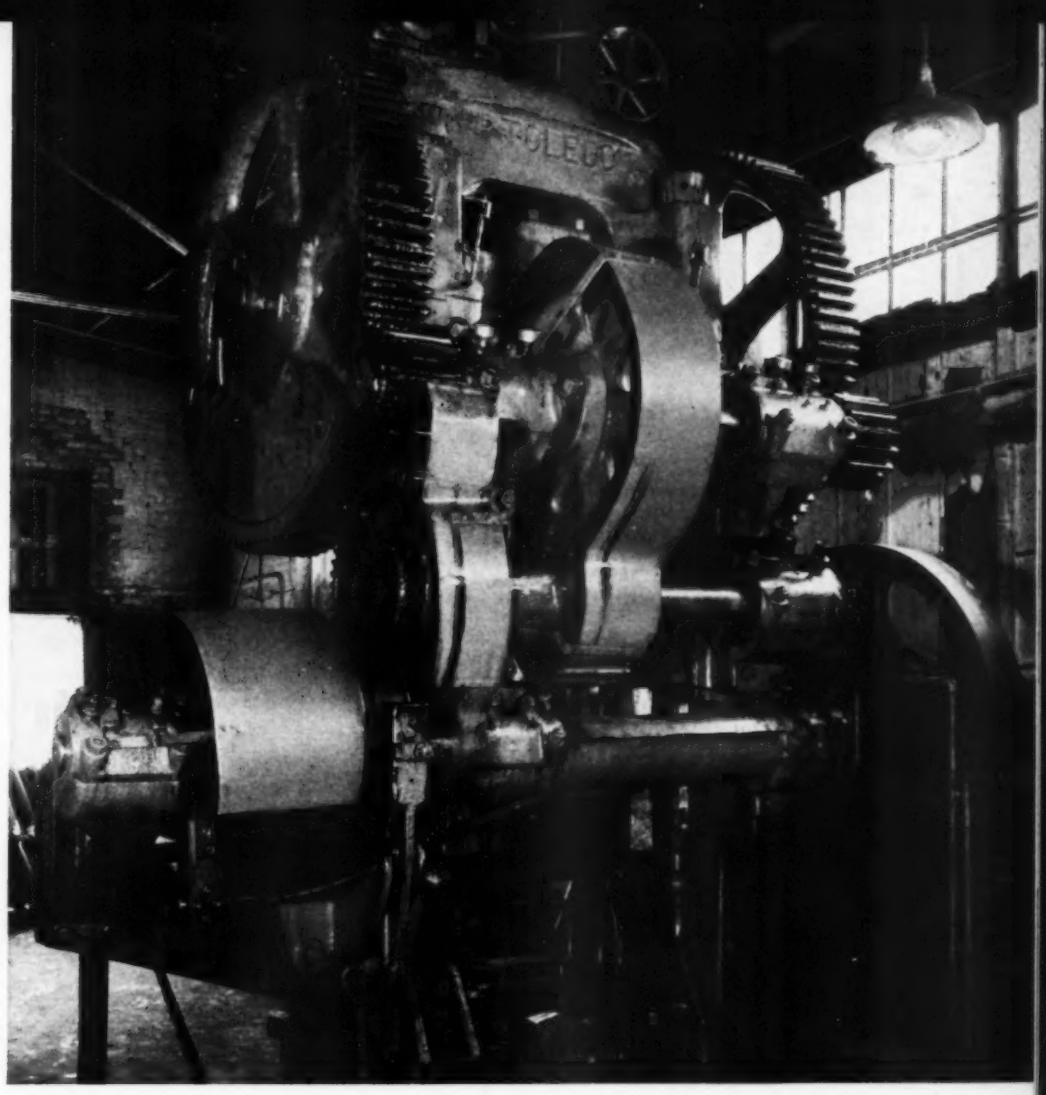
District Offices — New York, Chicago

TRENT TUBE COMPANY

TRENTWELD STAINLESS STEEL TUBES

Subsidiary of CRUCIBLE STEEL COMPANY OF AMERICA

440 Church Street, East Troy, Wisconsin



Where gears are <u>open</u> for trouble, try . . .

THE exposed gears on stamping machines were a source of considerable trouble in a midwest plant. Noisy operation and lubricant throw-off created an undesirable working condition for the press operators. Moreover, gears required frequent applications of grease, interfering with production and raising lubricant consumption.

Conventional greases, tried on the gears, failed to remove the difficulties. A Standard Oil Lubrication Engineer suggested the use of Calumet Viscous Lubricant No. 2X, a grease of superior adhesive quality. This lubricant clung to the gears, eliminating drippage and throw-off troubles. Fewer applications of the grease were required. Gear operation was smoother and quieter.

Where open gears, as well as some enclosed types, are difficult to lubricate, try Calumet Viscous Lubricants. Unlike many conventional gear shields, these lubricants are true greases, fortified with additives. Their superior adhesive quality and greater wetting ability give them high resistance to the washing action of water and to thinning and throw-off at high temperatures. All grades of Calumet Viscous Lubricants can be applied without heating, and all but the heaviest grade can be applied by spraying.

Calumet Viscous Lubricants

If your plant is located in the Midwest, write Standard Oil Company (Indiana), 910 S. Michigan Ave., Chicago 80, Ill., to secure the services of the Standard Oil Lubrication Engineer nearest you.

STANDARD OIL COMPANY (INDIANA) STANDARD

SAY! DO YOU REMEMBER MY NEW YEARS CARD OF 1938?

That was the year when the consumption of paper and paper board amounted to 13.5 million tons, and we were then using only 208 pounds per capita.

Gosh! How things have changed! Population has increased from 130 million to over 145 million (more than the entire population of Canada) and we are now using about 340 pounds per capita, in spite of this huge increase in population. Maybe it might be well to take a look at the chart. . . . An up-to-date appraisal of ourselves and our business sometimes helps the outlook on life and our future prospects. Of course, there is one thing not shown on the chart and that is an estimate of additional productive capacity in North America. Likewise no estimate has been made of the tonnage of pulp which is not now available from European countries which always used to bedevil the domestic producers and afford great satisfaction to the converting mills which had no pulp-making facilities. Present conditions warrant a careful survey for all concerned, but "baby production" continues and there are other latent demands for paper and paper board in the offing which will keep us going at a high rate of production for a long time to come.

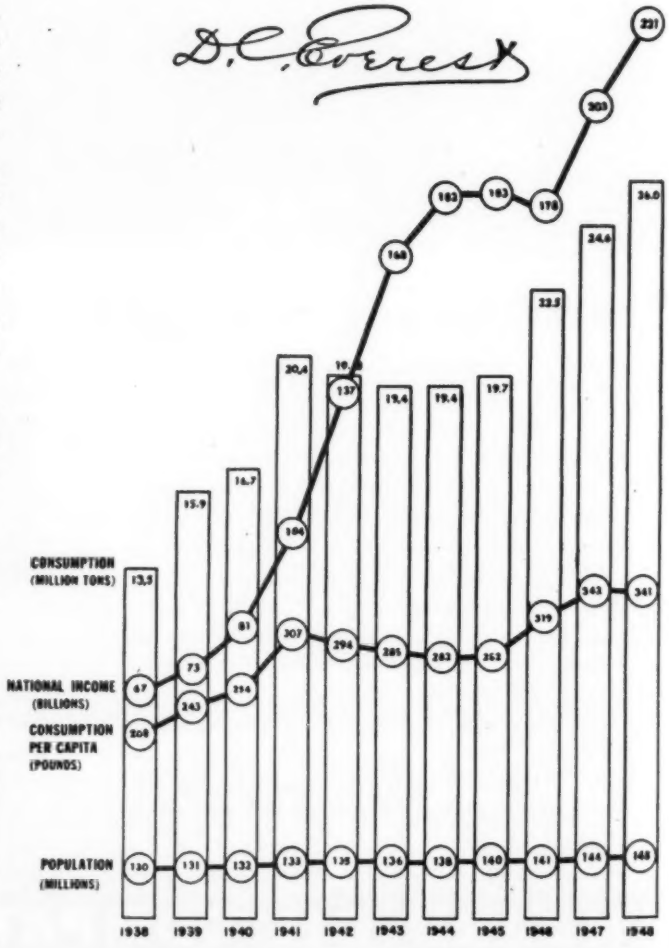
If consumption nearly doubled in 10 years and continues to increase for three successive years following V-J Day, this industry is not "going to hell in a hand basket."

Too many of us have acquired the "griping habit" regardless of what happens. I hope you will give this situation a little sober thought and thus be in a position to enjoy a—

HAPPY and PROSPEROUS NEW YEAR

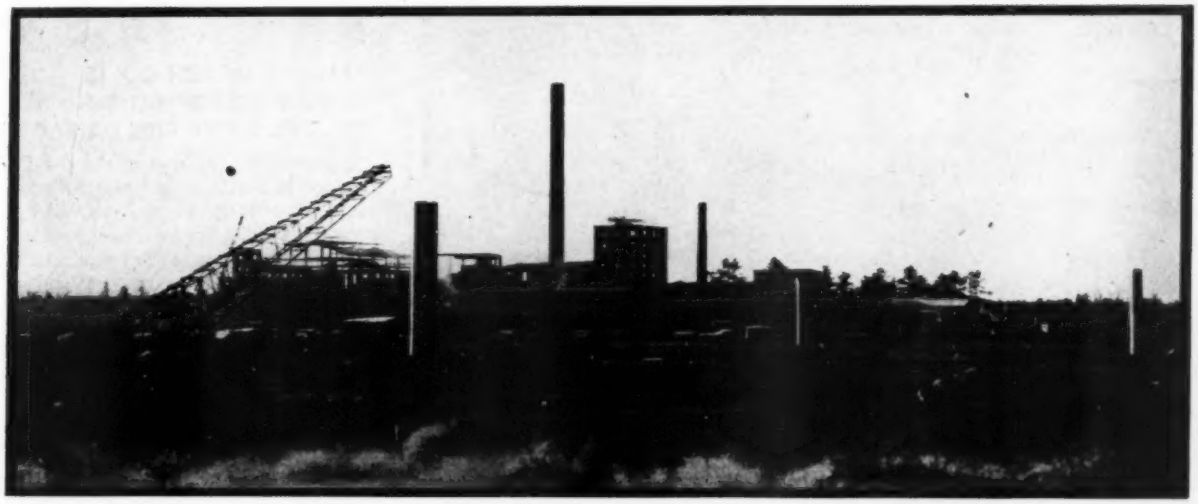
Sincerely,

D. C. Everest



Because of its inspirational message, this New Years Greeting from D. C. Everest is reproduced here with his permission. Mr. Everest is president of The Marathon Corporation and board chairman of Marathon Paper Mills of Canada, Ltd. He is a past president of the American Paper and Pulp Association and is vice president and trustee of The Institute of Paper Chemistry.

TRADE WINDS



General view of new pulp mill of Fraser Companies Ltd., near Newcastle, N. B.

New Sulphite Mill of Fraser Companies in N. B. Will Start Up Soon

▸▸▸ RAPIDLY NEARING completion, the new sulphite mill of Fraser Companies, Limited, near Newcastle, New Brunswick, is expected to begin operations in the near future.

The new mill, which is located at the junction of the Miramichi and Northwest Miramichi Rivers, is part of a $6,000,000 expansion program being carried on by the company. The major portion of this sum has been allotted for construction of the Newcastle Mill, which began in May, 1947. The mill is expected to go into operation in the fall of 1949.

About 350 men were employed during the summer months on the exterior brick and steel construction and two chimneys, one 235 feet tall and containing approximately 250,000 bricks, and the other 125 feet high.

When operating at full capacity, the mill will produce 120 tons, or four carloads of kraft pulp daily. This will be shipped by rail to Edmundston, New Brunswick, where the process will be completed, employing between 150 and 175 men.

To facilitate importing of raw material and export of the finished products, a 10,000 foot spur line has been laid by the Canadian National Railways to the site, and a large wharf is under construction on the river bank to aid in handling the pulpwood floated down the river.

Power for the new mill will be supplied by the recently-opened plant of the new Brunswick Electric Power Commission, at Chatham, about three miles away. Supplementary power will come from the company's own plant.

R. B. Murchie has been appointed superintendent of the mill and J. McCaffey will take over duties as plant engineer.

▼

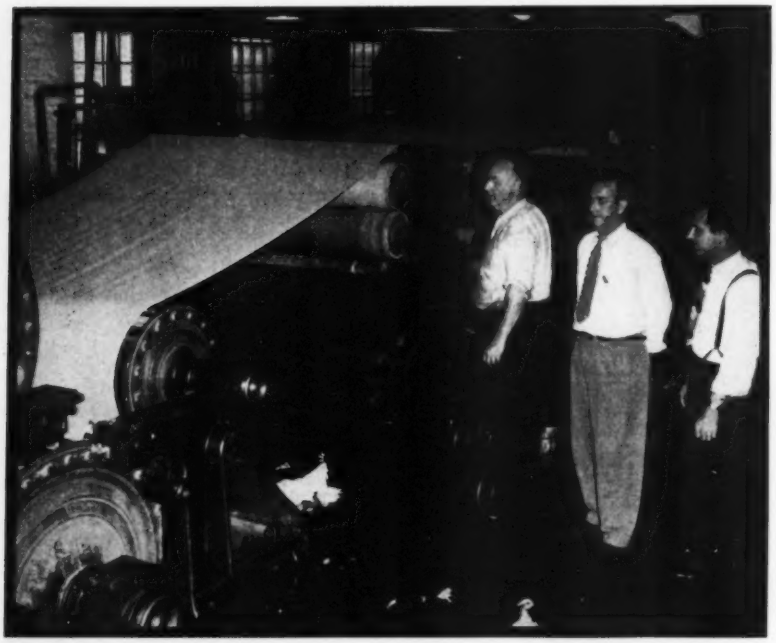
▸▸▸ THE NEW LOCATION of Chemical Paper Manufacturing Company's Chicago office is now 111 W. Jackson Boulevard, Room 518. E. W. Beimfohr and O. L. Bilx are representatives.

Two Machines in the Paper City Have Turned Out Newsprint

▶▶▶ FOR THE FIRST TIME in its history, newsprint is being made commercially on a paper machine in Holyoke (Mass.), the Paper City.

At the Riverside mill of American Writing Paper Corporation, one of the two machines is turning out newsprint made from deinked stock which is being used by the Springfield (Mass.) newspapers.

Newsprint made wholly from wheat straw is being made experimentally on one machine at the plant of Chemical Paper Manufacturing Company, in Holyoke. The facilities of this plant were made available to Kinsley Chemical Company, of Cleveland, for trying out runs on a commercial size machine. Previous experiments were made on pilot plant equipment. The newsprint made on this machine has been shipped out of Holyoke. It is believed it will be put to test on a press soon.



Newsprint from wheat straw is being made on this machine of the Chemical Paper Manufacturing Co., Holyoke, Mass. The paper company made its facilities available to Kinsley Chemical Company, of Cleveland, which company is conducting the experimental run. L to R—Ray Winkler, superintendent; C. J. Yarber, general manager, both of the Chemical organization; and E. R. Timbowski, chemist of the Kinsley company

▼

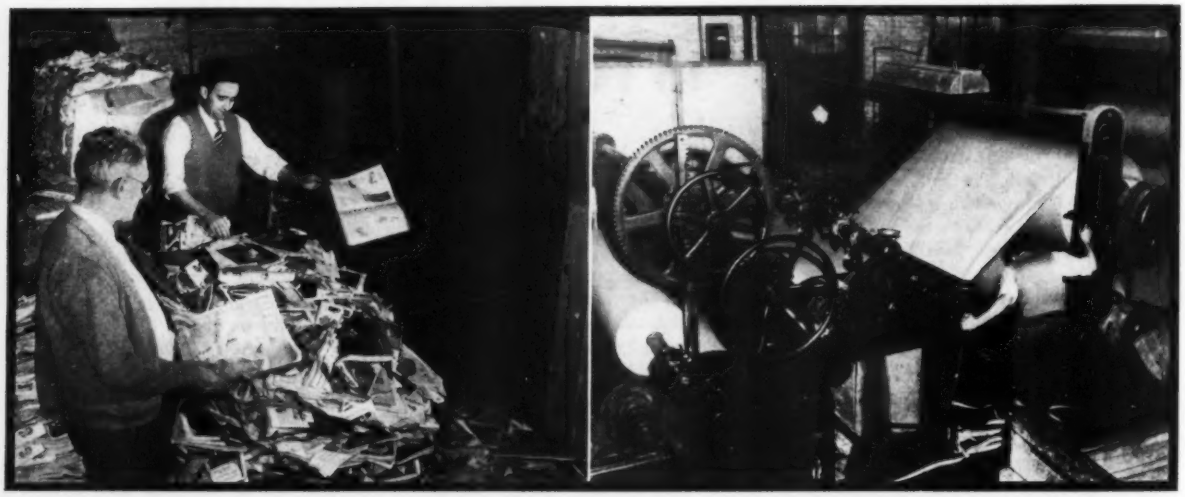
▶▶▶ OPERATION OF its 16th sales district has begun by the National Gypsum Company, Buffalo, New York, with headquarters in Pittsburgh, on January 1. William M. Richey, manager of the Cincinnati district, has been named manager. He will be succeeded at Cincinnati by Walter J. Stroud. The new district has been established because of the company's rapid growth in Western Pennsylvania, Northern West Virginia and Eastern Ohio.

▼

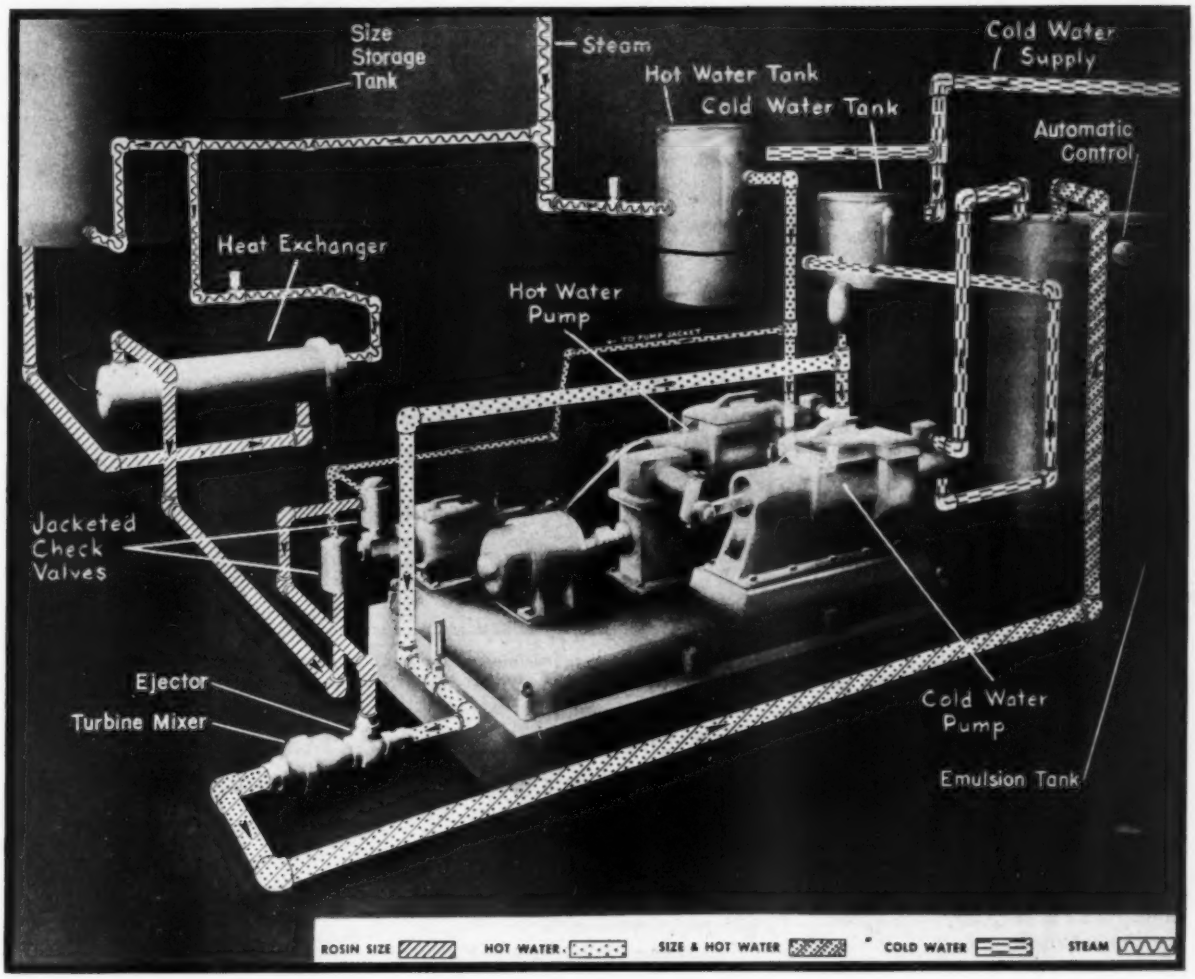
DIAMOND MATCH CO. IS NOW RESTORING B-F-D DIV. AFTER FIRE DAMAGE

Papermaking facilities of the B-F-D Division of the Diamond Match Company, Plattsburg, New York, badly damaged when a five-hour fire swept its mill, will be restored to full production by mid-January.

The mill's entire inventory of paper awaiting conversion was lost, but according to the company officials, the flow of items to customers will not be much affected. None of the finished products on hand was harmed and an ample supply of paper for conversion has been assured through the cooperation of competitor companies which are shipping supplies sufficient to last until the mill is in complete production.



LEFT—Wastepaper being processed for conversion into pulp (left) at the Riverside mill of American Writing Paper Corporation, Holyoke, Mass. H. J. Coyle, superintendent (at left), and Patrick J. McGinty, assistant superintendent. RIGHT—One of two machines in the Riverside mill which is turning out newsprint made from deinked pulp for use of the Springfield, Mass., newspapers



The Hercules Automatic Emulsifying Process for Rosin Size

Continuous Emulsification of Rosin Size

▶▶▶ COMMONLY USED batch methods of emulsion rosin size can now be supplanted by an automatically controlled continuous process. Installations in several mills making different types of paper have substantiated the usefulness of this new process, according to the Hercules Powder Company, whose engineers and technologists were responsible for its development.

By ordinary methods, size at 60 to 80 per cent solids is drawn from storage tanks or drums to a calibrated tank where it is heated. The hot size is then mixed with hot water and transferred to the emulsion storage tank where it is diluted with cold water. Concentration of the final emulsion is controlled by the amount of size used from the calibrated heating tank. With this method it is necessary to provide large emulsion size tanks or to prepare the size in frequent small batches.

Although the new process is based on the same fundamental principles as those used in the batch process, its automatically controlled operation can be adjusted to provide a more or less continuous supply of freshly emulsified size. This permits use of emulsions having limited stability without addition of stabilizing chemicals. The automatic process is said to reduce operating costs, reduce space requirements, and provide a size emulsion having a greater uniformity of concentration and quality.

In the new process, as shown in the accompanying flow sheet, the three components of emulsified size: size, hot water, and cold water, are proportioned together by a triplex unit consisting of three properly sized proportioning pumps driven by a single motor. This unit delivers these components at definite predetermined rates to obtain the desired final emulsion.

The paste rosin size flows from a storage tank through a heat exchanger, where the temperature is brought to a predetermined value (controlled automatically by a temperature regulating valve), and flows into the rosin size pump of the triplex unit.

The hot size is pumped to a mixing unit or ejector. At the ejector, it is combined through venturi sections with a stream of hot water from one of the pumps of the triplex unit to form the primary emulsion. The venturi sections of the ejector are constructed so as to give maximum mixing and homogenizing of the size and hot water. The primary emulsion formed in the ejector flows through the turbine mixer, which is a cylindrical chamber containing a spiral rotating baffle, where further mixing takes place. After leaving the turbine mixer, the emulsion flows to a small storage tank, where it is diluted to its final concentration with

cold water from the third pump of the triplex unit.

The emulsion storage tank is equipped with a float-control device which starts and stops the motor of the triplex unit as the emulsion level in the tank drops or rises to the control points, thus making the system function automatically. Size emulsion is drawn from the storage tank as needed.

An interesting modification of the process as described can be made in a mill where size emulsion is being added to the stock at only one point. Here a variable speed motor drives the triplex unit. The process is operated continuously at rates controlled by a calibrated rheostat located in the machine room. Since emulsion flow is direct and complete to the stock at one point, the process functions not only to prepare emulsion but to meter emulsion to the stock.

When properly installed, the only labor required for the automatic process is the preventive maintenance customary for comparable mechanical equipment.

In the automatic emulsifying process, there are several auxiliary pieces of equipment such as a small tank, equipped with float control and temperature regulator, which supplies hot water to the system, and a small tank, equipped with float control, which supplies cold water.

With the exception of the ejector and turbine mixer, which are supplied and serviced by Hercules, all equipment for the automatic process is obtained direct from equipment manufacturers. Engineering details on layout, construction, capacities, etc., are available from Hercules Powder Company, Wilmington, Delaware.

▼

BIRD & SON INSTALLS HIGH VOLTAGE ELECTRIC SYSTEM

A new power plant and installation of high voltage electric generating and distribution equipment to replace the present plant has been begun for Bird and Son, Inc., East Walpole, Massachusetts by the Rust Engineering Company, Pittsburgh, Pennsylvania.

The new system will generate and distribute electric energy at 13,800 volts to unit substations throughout the plant where it will be stepped down to the required voltage. Present switching equipment will be modernized to provide protection against short circuits and overloads in the new electric distribution lines.

New equipment to be installed includes a 5,000 kw noncondensing bleeder turbine and a 175,000 lb per hour boiler. The boiler will be equipped to burn either pulverized coal or oil and will produce steam at a 650 lb pressure and a 750 degree total temperature.

The project also includes the design and installation of a complete water treatment plant and coal and ash handling system. Construction of the power plant addition will begin late in 1948 and is expected to be in use by the end of 1949.

▼

ST. CROIX PLANS $600,000 PLANT IMPROVEMENTS

A $600,000 plant improvement program has been announced by the St. Croix Paper Company for its mill at Woodland, Maine. During the past two years, the mill has lost a considerable amount of tonnage because of low water in the St. Croix river.

In order to prevent this loss, the present power of the mill will be increased by the addition of a new 60 cycle 6,250 kv-a steam turbo-generating unit. The turbine will be of the double extraction type so that steam will enter the turbine at 400 lb pressure psi. Part will be taken out at 110 lb pressure, part at 20 lb pressure and the remainder will go to a surface condenser. The advantage will be gained by using for power production the steam used in operating the machines and drying the paper.

The present steam turbo unit will be equipped with a new 60 cycle generator, and a new 4,000 hp 60 cycle grinder will also be installed. The old turbos, which operated two paper machines, will be replaced by new turbos with greater capacity. Two new Bird screens will be installed on these machines.

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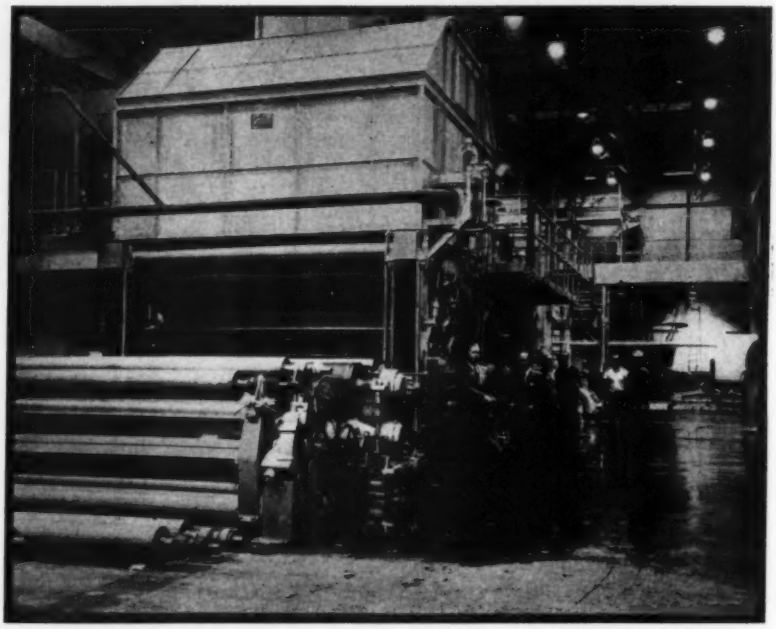
IMPORT NOTES

In reporting the development in current Reciprocal Trade Agreement negotiations, Warren B. Bullock, Manager of the Import Committee of the Amer-



This 132-inch Yankee fourdrinier paper machine recently was put into production at the Plattsburg (N.Y.) plant of the B-F-D Division of The Diamond Match Co.

B-F-D Division of Diamond Match Co. Adds 5th Machine—Yankee Fourdrinier

Increasing the daily output of facial-type tissue by 25 tons daily, the B-F-D Division of the Diamond Match Company, Plattsburg, New York, has added a fifth paper machine.

The machine is a 132-inch Yankee fourdrinier and was built by the Beloit Iron Works, Beloit, Wisconsin. Engineering of the job was by the Charles T. Main Company of Boston, Massachusetts. The Merritt-Chapman and Scott Corporation of New York City was the contractor.

Bradford O. Preu, vice president in charge of the B-F-D Division, and J. O. Julson, general manager of its paper and pulp operations, presided at ceremonies marking the formal start of the machine as a working unit.

PAPER · · · America's 6th Industry

MATTRESS SHIPPING IN PAPER BAGS

(NEWS ITEM: *A heavy paper bag with a self-seal closing feature has been developed for shipping mattresses.*)

Faster, cheaper, handling of mattresses is now possible with the development of a new paper shipping bag. A self-seal closing feature, consisting of two surfaces of adhesive which seal instantly and securely upon contact, eliminates time-absorbing tape sealing. Made of three-ply heavy kraft paper, this new bag meets all the requirements of national railroad and trucking associations. We will gladly supply bag manufacturers' name on request.

Auto seat covers made of paper . . . suds from paper tissues . . . paper for steam pressing . . . new uses for paper calling for new standards of lightness and toughness, new standards of quality in performance.

To meet these new responsibilities and new opportunities developed by the Pulp and Paper Industry, the Puseyjones Organization is now devoting itself completely to the design and construction of Paper-Making Machinery built to new high standards of speed and efficiency, and to the modernization of existing machines.

Additional capacity in Metals Fabrication is now available through conversion of facilities formerly devoted to the building of ships.

Puseyjones Engineers will welcome the opportunity to work with you in solving production problems.

THE PUSEY AND JONES CORPORATION
Established 1848. Builders of Paper-Making Machinery
Wilmington 99, Delaware, U. S. A.

THE SIGN OF TRADE MARK SUPERIOR QUALITY

ican Paper Industry, stated that briefs have been filed in reference to the following grades of paper and paperboard: sulphite wrapping papers, glassine and greaseproof papers, kraft corrugating board, and all types of plain paperboards.

The pulp producers expressed apprehension of price distortions due to dumping and devaluation of foreign currencies. In most cases the briefs were prepared by the Import Committee. Personal appearance was made only in behalf of the producers of glassine and greaseproof papers.

Representatives of Finnish manufacturers filed briefs arguing for a reduction of the duty rates on pulpboards, fiber boards and glassine paper. These briefs were supplemented by oral arguments before the Committee for Reciprocity Information advocating lowered rates of duty on Finland's principal export grades.

Canadian wrapping paper with a decorative green stripe is before the authorities for classification, the issue being whether it is dutiable as wrapping paper or under the special provision for decorated uncoated paper. The dutiable value of the paper is also in question.

Other new cases in the United States Customs Court include the following:

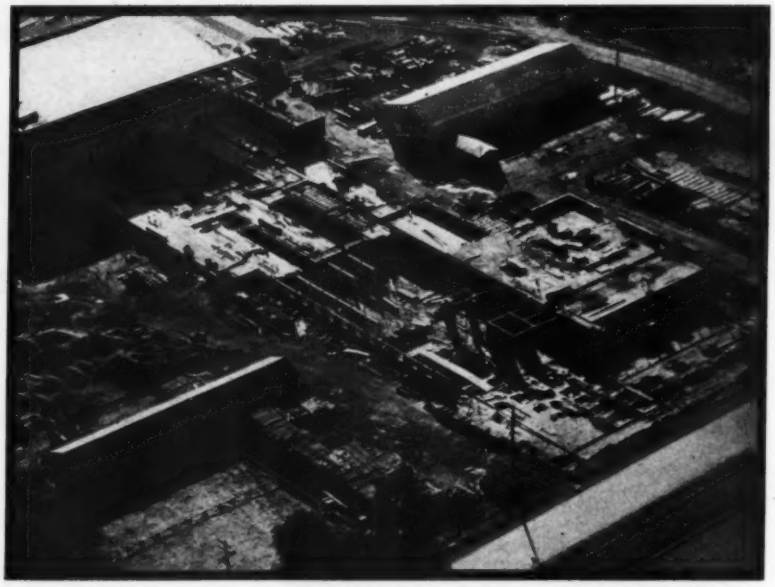
Corrugated paper, asphalted to a paperboard base, held dutiable at 35 per cent as a manufacturer of paper, is claimed to be dutiable at 30 per cent as laminated paperboard; decorated fancy paper from France classified at 4½ cents per pound and 20 per cent is claimed to be dutiable as coated paper at 5 cents per pound and 15 per cent; English serviettes, classified for duty at 35 per cent as manufacturers of paper, claimed to be dutiable at 30 per cent as paper cut into shapes; Finnish paper classified as sulphite bond at 3 cents per pound and 15 per cent, claimed to be dutiable as printing paper at one-fifth of one cent per pound and 5 per cent.

▼

PAPER MACHINE FROM PLANT AT HAMILTON WILL GO TO CHAMPION'S PASADENA MILL

Increasing the output of finished paper by 25 per cent, the Champion Paper and Fibre Company, Houston, Texas, is planning to install new equipment at the Pasadena plant on the Houston Ship Channel. It is understood that the new equipment is in addition to the $7,000,000 postwar expansion program started about two years ago.

The equipment is being moved from the Hamilton, Ohio, plant and consists of a paper machine weighing about 1000 tons. The foundation for the huge paper machine was being constructed late in December and it is expected that the installation should be completed by the spring of 1949. The machine is known as the No. 25 paper machine and can produce a variety of papers such as bond, envelope, tablet, and offset papers.



A partial view of the new board mill under construction by Sutherland Paper Company's Standard Division, Kalamazoo, Mich.

▼

▶▶▶ STOCKHOLDERS OF Rayonier Incorporated, New York City, producers of purified wood cellulose, have approved an employees' retirement income plan to become effective immediately. Full cost of the plan is to be borne by the company.

▼

$227,000 DAMAGES SOUGHT BY PATERSON PARCHMENT

Filing suit under the Taft-Hartley Act, the Paterson Parchment Paper Company of Bristol, Pennsylvania, is asking damages of $227,000 from the International Brotherhood of Paper makers and its Bristol local No. 500, for breach of contract.

The union is accused of calling a strike while a contract was still in force. The strike began August 20 and the plant has been closed since that time. The United States District Court at Philadelphia is asked to award damages at the rate of $3,500 per day from August 20 to October 26, when the suit was filed, and in addition, damages at the same rate until the strike is ended. The company charges that an illegal strike is costing the amount stated each day it continues in effect.

WORK BEING COMPLETED ON SUTHERLAND'S NEW PLANT

Building by the acre is the way the Sutherland Paper Company's project at the Standard Division of its Kalamazoo, Michigan, plant looks from the air. The job is a $2,750,000 building project, including a new 136-in paper machine and space for another machine, beater room, finishing room, boiler room, warehouse, new turbine and several hydrapulper machines.

The plant was started in 1947 (cf. P.I. and P.W. Aug., 1947) and the work has progressed to the extent that the warehouse is completed; the beater room is about 80 per cent finished, and the machine room about 30 per cent complete. The over-all area of the buildings and facilities involves a plot 750 ft long and 275 ft wide.

▼

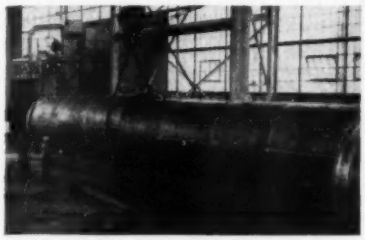
FINANCIAL

▶▶▶ THE YEAR END saw little change in the prices of paper mill securities as compared with the end of November, but the general level was materially below the prices at the end of 1947.

Champion Paper & Fibre Company—Net income for the quarter ended September 30 was $2,611,342, after provision of over $500,000 in reserves to meet increased cost of replacements and similar contingencies. No comparison with previous quarters is practicable because the company's fiscal year has been changed to end March 31 instead of April 30.

Crown-Zellerbach Corporation—Net income for six months ended October

One of the plates is rolled into shape. The edges of the plate have already been prepared for welding.



Cylindrical sections are welded together and the elliptical ends are put on. Longitudinal welding has already been done.

Automatic welder in action. Both the longitudinal and round about seams are welded automatically.

The seams of the tank are being x-rayed. In this process any cracks or flaws in the welds are detected.

It takes more than steel to make a tank . . .

. . . it also takes skill, experience, and equipment—all in large amounts. Some of these extra ingredients are brought to light in the accompanying views which show the fabrication of a cylindrical pressure tank in our Chicago plant.

We build many types of steel plate structures for the pulp and paper industry including digesters, Marx Savealls, spherical acid accumulators, flat-bottom storage tanks, cylindrical pressure vessels, and elevated water tanks. We have special facilities for stress-relieving and x-raying pressure vessels when the specifications require it, and we have equipment at our Eastern plant for pickling and painting fabricated steel plates.

The next time you need steel plate work, write our nearest office and outline your requirements.

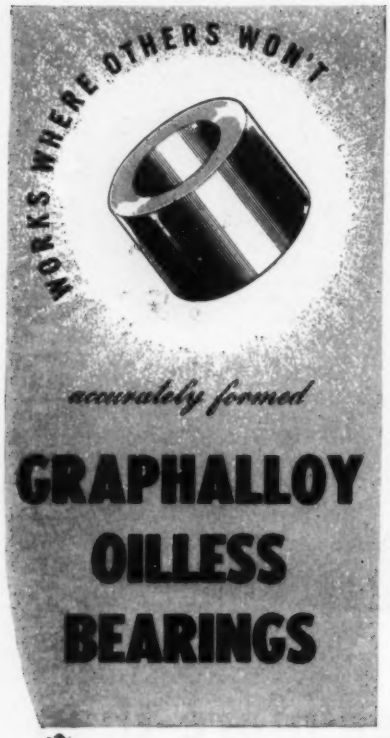
The tank is tested hydrostatically.

On the flat car ready to go.

CHICAGO BRIDGE & IRON COMPANY

Atlanta, 3 ..... 2143 Healey Building	Detroit, 26 ..... 1566 Lafayette Building	Philadelphia, 3 ..... 1453-1700 Walnut Street Building
Birmingham, 1 ..... 1511 North 50th Street	Havana ..... 402 Abreu Building	Salt Lake City, 1 ..... 1527 First Security Bank Building
Boston, 10 ..... 1026-201 Devonshire Street	Houston, 2 ..... 2143 National Standard Building	San Francisco, 11 ..... 1217-22 Battery Street Building
Chicago, 4 ..... 2445 McCormick Building	Los Angeles, 14 ..... 1459 Wm. Fox Building	Seattle, 1 ..... 1327 Stuart Building
Cleveland, 15 ..... 2267 Guildhall Building	New York, 6 ..... 3350-165 Broadway Building	Tulsa, 3 ..... 1651 Hunt Building

Plants in BIRMINGHAM, CHICAGO, SALT LAKE CITY, and GREENVILLE, PA. In Canada: HORTON STEEL WORKS, Limited, FORT ERIE, ONT.



31 was $10,374,823 as compared with $9,676,875. The 1948 showing is in spite of losses of $1,300,000 due to the disastrous floods in May.

Gaylord Container Corporation — Net income for nine months ended September 30 was $5,828,916 as compared with $7,065,514 a year ago.

Marathon Corporation — Net earnings for the fiscal year ended October 31 were $5,593,238 as compared with $4,654,457 for the previous fiscal year.

National Container Corporation — Net profit for nine months ended September 30 was $5,124,469 as against $8,288,615 a year ago.

Puget Sound Pulp & Timber Company—Net profit for the first nine months of 1948 was $4,468,339 as compared with $3,542,603 a year ago.

Robert Gair Company—Net profit for nine months ended September 30 was $3,732,696 as against $4,340,643 for the same period in 1947.

Paper Mill Corporate Changes

Fraser Companies — The directors have announced to stockholders that a subdivision of existing stock will be submitted for approval and also the issuance of $5,000,000 in preferred stock. While much of the company's operations are in Canada, an important element is the Madawaska, Maine, plant of the American subsidiary, Fraser Paper Company.

New York Stock Exchange—Stocks

	Closing Prices Dec. 31, 1948	Nov. 26, 1948	Dec. 31, 1947
A.P.W. Products	4	*4¼–4⅝	5
Celotex	26⅛	24½	27⅞
Same Preferred	18	*18½–18⅝	20
Certain-teed Prod.	12¼	12¼	17⅞
Champion P & F Co.	22⅜	23	22
Same Preferred	91½	94¼	99
Chesapeake Corp.	26⅞	*28¼–28¼	—
Container Corp.	33⅞	35⅝	42¼
Same Preferred	95½	*91⅝–92½	94
Continental Diamond	8½	8⅞	11½
Crown Zellerbach	25	25	33⅞
Same Preferred	96	95⅝	99
Same $4 Preferred	95	*95–97	127
Dixie Vortex	27	28	39
Same "A"	50	48	53
Eastern Corp.	13½	16	—
Robert Gair	6⅝	7¼	8⅞
Same Preferred	17½	17⅝	20
Gaylord Container	21⅝	17⅝	22⅞
International Paper	51⅝	52¼	53
Same Preferred	93½	92¼	94½
Kimberly Clark	20⅝	21½	21⅝
Same Preferred	94½	95½	103
McAndrews & Forbes	35½	*36⅝–37½	39
Marathon	20⅜	20⅜	22
Masonite	57	57½	60
Mead Corp.	16¼	16½	19⅝
Same Preferred	82	82½	93
Same 2nd Preferred	32	32⅞	41⅛
National Container	9⅜	9⅜	13⅝
Paramine Cos.	19	20¼	—
Same Preferred	103½	*102–104	96¼
Rayonier, Inc.	28	27½	30½
Same Preferred	32	*32⅜–32½	33⅞
Scott Paper	47⅜	47¾	44⅝
Same Preferred	93	*88¾–90	93
St. Regis	8½	8⅝	16
Same Preferred	80⅝	83¼	93
Sutherland Paper	32⅜	*36–38	43½
Union Bag & Paper	30⅝	29⅝	33½
United Board & Carton	6½	8	14½
United Wall Paper	2⅞	3¼	5⅝
Same Preferred	22½	*24½–28	35
U.S. Gypsum	101¾	101	165
Same Preferred	173	*171–174	171
West Va. P&P Co.	40	42	44½
Same Preferred	108	*105–108	104

New York Stock Exchange—Bonds

Celotex 3½%	101⅜	—	—
Champion, P&F Co. 3%	99⅝	—	98⅜
Certain-teed 3%	—	—	—

New York Curb Exchange—Stocks

Am. Writing	5⅜	5	9
Great Northern	36½	36¼	47
Taggart	11¼	8	10½

*Closing Bid and Asked Prices.

Washington News

PLANNING CONF. HELD BY NATIONAL SEC. R. BOARD

Plans of the National Security Resources Board for mobilization of the paper and pulp industry in the event of a future war have been outlined in detail to a group of paper mill executives including particularly those who had served in an official capacity with the War Production Board in World War II. The meeting was on invitation of J. D. Mylrea, head of the Board's Forest Products Division, with Oliver M. Porter, chief of the Pulp, Paper and Paperboard Branch, presiding; and was held December 1 and 2. The discussion was intended to secure from industry leaders their advice on the best method of organizing the new Board to secure the most effective mobilization, and was essentially a defense planning conference.

A key point in the discussions was a recognition of the need to establish, as completely as possible, hemispheric self-sufficiency to cover manpower, logs and pulpwood, wood pulp, newsprint, and other papers, paperboards and their converted forms.

The question as to the extent of wartime controls which might be established will be settled by Congress, but the Board has drawn up a statute to give the board complete control over industry when and if war should come. The law as proposed would be a standby measure to be made instantly applicable in the event of emergency. Whether or not such legislation will rest with Congress and the Administration.

FTC HAS APPROACHED ALL PAPER MFG. ASSOCIATIONS—INVESTIGATIONS PROBABLE

As a result of the decisions involving the use of basing points or zones in the merchandising of manufactured products, the Federal Trade Commission has approached all of the paper manufacturing associations with a view to investigating the methods used in sales of the various products. Inasmuch as the Book Paper Association already has been under investigation, it is exempted from the proposed investigation. The ultimate outcome is not certain, and no investigation has yet begun in any of the associations.

This investigation involves a broad policy which was opposed by the industry in formal appearances before a Senate committee a few weeks ago. In that hearing, the industry pointed out

the difficulties in setting up an arbitrary pricing method based exclusively on fob mill prices. The future of the proposed investigation is, therefore, interlocked with legislative action which may come early in the next session of Congress as a result of the so-called cement case, in which mills were ordered by the Federal Trade Commission and the courts to abandon the existing zone method of selling.

▼

▶▶▶ WHEN CONGRESS held its final session on December 31 the special house committee set up to investigate newsprint supplies filed its report predicting that newspapers will continue to have trouble securing enough paper throughout 1949 and possibly into 1950. The report said that supply is slowly catching up with demand, but publishers are still unable to get all they want. The report said that with proper financing and initiative the Southern States could supply nearly 2,000,000 tons of newsprint a year in addition to producing other grades of paper. The establishment of a large paper industry in Alaska was suggested and a decision should soon be made whether Alaskan timber resources should be used for paper or for other purposes

▼

MANDO WINS GOVERNMENT APPROVAL OF 25-YEAR CUTTING RIGHTS IN NW

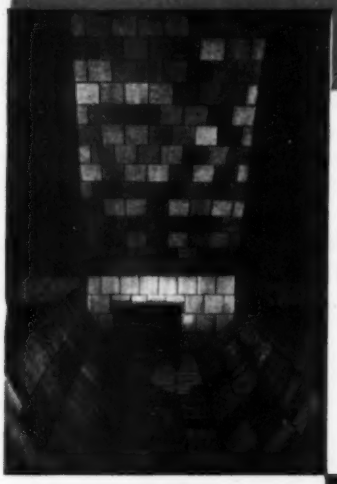
Approval of a twenty-five year contract for cutting rights on 52,841 acres of timber land on the mainland area of the Northwest Angle has been received by the Minnesota and Ontario Paper Company, Minneapolis, Minnesota. This will be the first attempt on any large scale at commercial logging in this area.

Mando obtained the twenty-five year cutting rights on this land as the result of being high bidder at a recent auction held at Red Lake, Minnesota, conducted by the United States Indian Service. The land involved belongs to the Red Lake band of Chippewa Indians, and comprises approximately 70 per cent of the 130 square mile mainland peninsula. Estimates of timber come to about 318,000 cords. Most of this is in stands of mature and overmature poplar and spruce, and some is in need of immediate cutting.

Under the terms of the contract, Mando is required to cut a minimum of 15,000 cords per year for the first ten years. The timber would be cut according to instructions from the United States Indian Service which will have a forester in the area, supervising cutting regulations at all times.

To conduct its cutting operations,

For Resistance to Both
ALKALIES AND ACIDS
use
DURISITE CEMENT



Durisite Alkali-and-Acid-Resisting Cement will handle both strong and weak alkalies, strong and weak acids, as well as all solvents.* It will handle acids and alkalies alternately. And it will handle such solutions at temperatures up to 350° F. 375° F.

**Except for highly oxidizing solutions.*

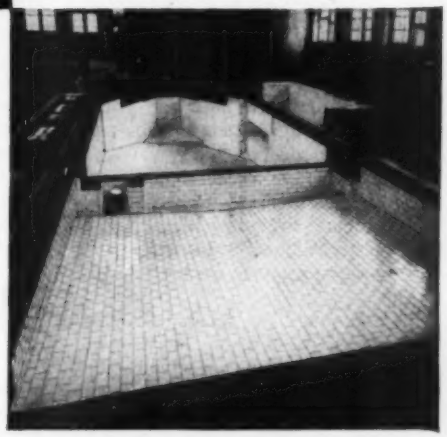
THESE EXTRA *Advantages* MAKE DURISITE YOUR BEST BET

1 Durisite is non-toxic . . . Has no dangerous effect on the skin.

2 Durisite can be stored indefinitely . . . No deterioration, no spoilage loss.

3 Durisite is dense, non-porous . . . Absorption less than ½ of 1%.

4 Durisite sets quickly by chemical action . . . Takes an initial set in 20-30 minutes.



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FREE BOOK
56-page manual on Corrosion-Resistant Masonry Construction . . . yours on request. Ask for Bulletin 813.

U. S. STONEWARE
Since 1865 • Akron 9, Ohio

E. E. Grant, president of The Crystal Tissue Company, Middletown, Ohio, presents gift watches to group of employees who have completed 25-yr. service with the company.

Mando plans to establish a main camp in its operating area on the angle, and will truck the pulpwood from this peninsular area through Manitoba, Canada, back to the railroad. A majority of the wood will be processed at the company's pulp, paper and insulation board mills located at International Falls, Minnesota. As present plans call for removal of the wood by the land route only, the company expects to start improving existing roads and trails into the area as soon as possible.

▼

PRICE BROTHERS GIVE FORESTRY SCHOLARSHIPS

The first five of a series of scholarships donated for competition among forestry students of the University of New Brunswick by Price Brothers and Company, prominent pulp and paper manufacturers of Quebec province, have been awarded.

Each of the five awards has a value of $400 and three are for senior forestry students, two for juniors. About 250 forestry students of the University are eligible to compete for the scholarships.

Price Brothers has donated $10,000 for scholarships, and sons of the company's employees are to receive preferences in the awards, although none competed this year.

▼

NEW COMPANY FORMED AT HINSDALE, N. H.—WILL MAKE INDUSTRIAL TISSUES

The output of the G. E. Robertson & Company paper mill, at Hinsdale, New Hampshire, will be converted into toilet tissue by a new company which has just been formed and which will do business as Gratton-Weeks, Inc.

The new company is owned by Leo Gratton and Harold Weeks, who in 1945 acquired control of the G. E. Robertson & Company plant. New equipment has been purchased and as the business expands, additional equipment will be added. A modern building has been constructed to house the new industry.

▼

SERVICE AWARDS GIVEN TO 15 EMPLOYEES OF CRYSTAL TISSUE AND WAXING COS.

At the annual Christmas part of The Crystal Tissue Company, Middletown, Ohio, 25-year service award watches were presented to fifteen employees of The Crystal Tissue Company and The Crystal Waxing Company, Middletown, Ohio.

More than 700 employees and their families attended the celebration. The presentation was made by company President E. E. Grant. These awards now make more than thirty-five Crystal employees who have a 25-year service record with the company. This is just about 10 per cent of the total number of employees.

▼

SPRING COURSE IN PULP AND PAPER, ALSO PRINTING, ANNOUNCED BY N. Y. UNIV.

In its program of study in the field of paper, pulp and printing, New York University's adult unit, the Division of General Education will offer four courses during the coming spring term. The program will be under the direct supervision of Assistant Professor Sidney G. Roth who is charge of technical studies for the Division of General Education.

Professor Roth states that interest in the program has grown partly through the fine support it has received from industrial leaders. Illustrating this point, he said that the Survey Course in Pulp and Paper was the original suggestion of R. G. Macdonald, secretary of TAPPI. This course will be led by Frederic C. Clark, consulting engineer and a past president of TAPPI. Among the guest lecturers in this course will be E. W. Tinker, executive secretary of the American Paper and Pulp Association; Vance P. Edwardes, International Paper Company, past president of TAPPI; Phillip Goldsmith, Pusey & Jones; and J. D. Malcolmson, Robert Gair Company.

Courses to be given in the spring term will include: Survey Course in Pulp and Paper, Basic Course in Printing Inks and Processes, Seminar in Processes of Inks, Paper and Printing; Lithographing Processes and Materials.

All courses will begin the first week in February, and each class will meet for fifteen weekly two-hour sessions.

▼

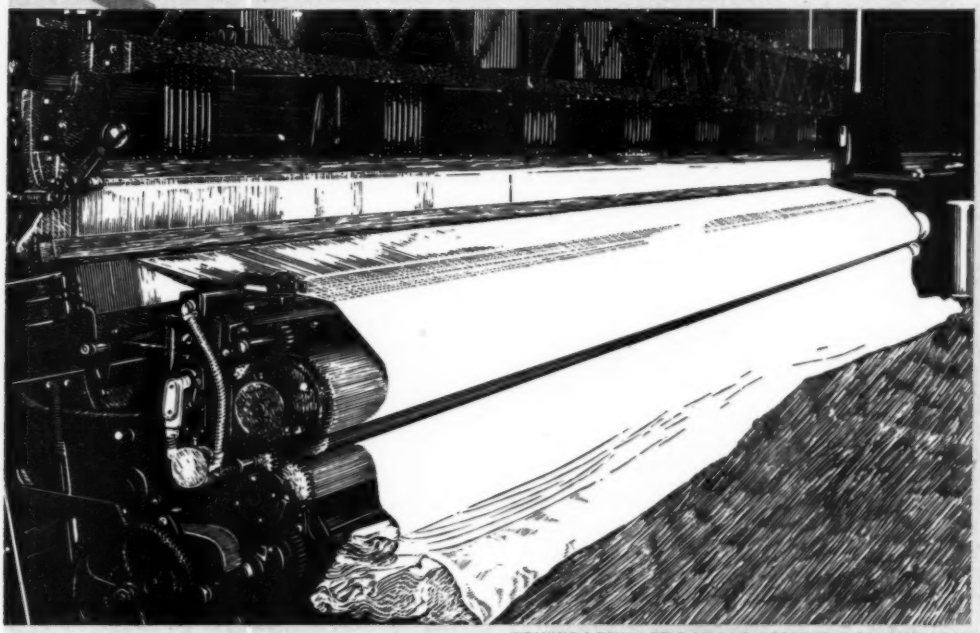
I. P. CO. DEMONSTRATES THINNING OF PULPWOOD BEFORE FORESTRY GROUP

A total of 350 visitors attended a pulpwood thinning demonstration staged by the International Paper Company near Raleigh, North Carolina, on November 17. The visitors included approximately 125 dirt farmers, 150 other farmers taking veterans vocational training, and 100 or more visitors from the annual meeting of the North Carolina Forestry Association.

B. T. Griffith, conservation forester for the International Paper Company, conducted the demonstration. The site was an old-field stand of loblolly pine approximately 36 years old. Although a pure stand, and fully stocked, it is growing on rather poor soil and is below the average for similar stands in North Carolina. Badly in need of thinning, the growth rate had slowed down, and there were numerous diseased trees in the tract; so the owner, Mrs. George McCullers, consented to loan it to the International Paper Company for permanent demonstration.

TENAX FELTS

—are made for your paper machines
—for better—more efficient
—more economical operation

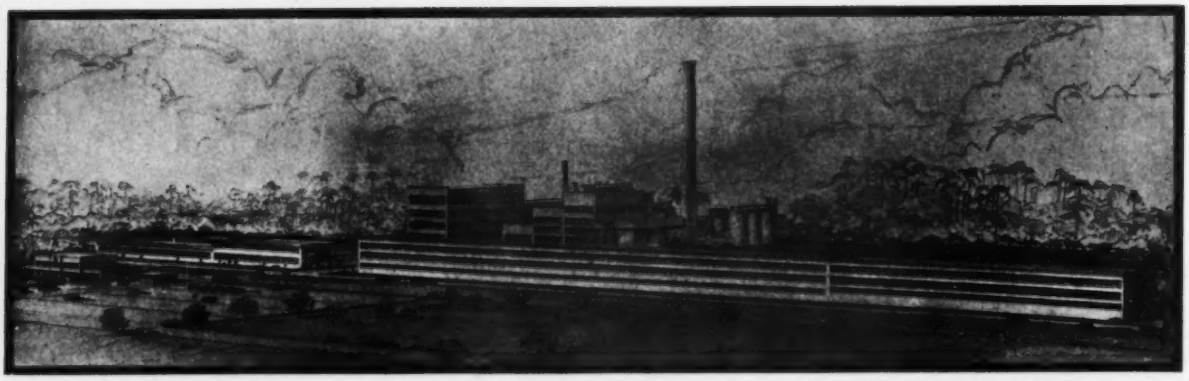


WEAVING A TENAX FELT ON A LOCKPORT FELT COMPANY LOOM

The skill and experience of more than 50 years are woven into every Tenax Felt made to serve the paper industry.

The Lockport representative in your territory is fully qualified to advise on all technical questions relating to felts. He is at your service as is our plant and all its people. We invite your inquiries.

LOCKPORT FELT COMPANY · NEWFANE, NEW YORK



Artist's drawing of rayon pulp mill which the International Paper Co. plans to build at Natchez, Miss.

Historic Natchez Chosen By I. P. Company as Site of New $20,000,000 Rayon Pulp Mill

▶▶▶ READY TO BUILD in Natchez (Miss.) a new $20,000,000 rayon pulp mill—if the bond issue for $300,000 to provide funds for the purchase of the site is approved by the people of Natchez — the International Paper Company expects to employ a very large number of local people and have an annual payroll of $2,500,000 when the mill is in full operation.

Major Jack Friend, vice president of the Southern Kraft Division of International Paper Company, speaking before the Association of Commerce in Natchez on December 14, stated that the effect of the new mill—if it is built in Natchez—should make itself felt the moment company engineers start to work. In addition to the new jobs which will be created in the mill it is expected that there will be some 1400 outside jobs created for the production of pulpwood for this mill. It will be a market for about 270,000 cords of pulpwood a year.

When the mill is in operation its annual payroll will be 8½ times the value of the mill site. To establish a new mill, experienced personnel already employed must be drafted, but also a great many new people must be drawn into the operations.

Building the mill is a very substantial undertaking itself. It will pour a great deal of money into Natchez and the surrounding area. It is estimated that it will take approximately 15 months to get the mill into operation once the company is free to move ahead.

International Paper Company's new mill, which will have an output of 300 tons of rayon pulp daily, will be the first in the world to use hardwood instead of softwoods in the commercial production of dissolving pulps. (Cf. P.I. and P.W. Dec., 1948). The new process is based on the suphate or kraft process instead of on the sulphite process used traditionally for making such pulps. From the viewpoint of the growing rayon industry in North America, this development means that dissolving woodpulp production will be sufficient to meet the increased demands from new rayon yarn capacity, existing and authorized.

▼

BRITISH PAPER NOTES (November, 1948)

The British Paper Trade, having completed the first month of a new license period with slight additional quotas to periodicals and other consumers, finds the general position little changed. Despite more paper entering the market, available supplies have been taken up quickly and some late orders will be difficult to place. This particularly applies to M. G. posters and wood quality printing and writing papers. The esparto qualities are also well in demand for better class printing and the only spot where supplies are plentiful is among the coated qualities but as the 1949 British Industries Fair is only three months away, the greater part of this tonnage will be absorbed.

Since the beginning of the present license period, the Paper Control has made two further concessions. The rapid building up of newsprint stocks as a consequence of production being lifted to 45 per cent of prewar and the prospects of at least the same total of imports during 1949 as in the present year (125,000 tons), if not more, newspapers are to be increased in size to five pages daily, i.e., six pages on alternate days, from January 2. At the same time, circulations are to be freed again, therefore, every daily and weekly newspaper will be able to find its true level. Whether this free circulation will lead to increased consumption of newsprint remains to be seen but it is anticipated that only a reader switch will operate, as it is felt that circulations have nearly reached their limit. The other concession is in respect to circulars which are being permitted on a slightly higher scale. Newspaper and circular production will, therefore, be back to their position at the middle of 1947.

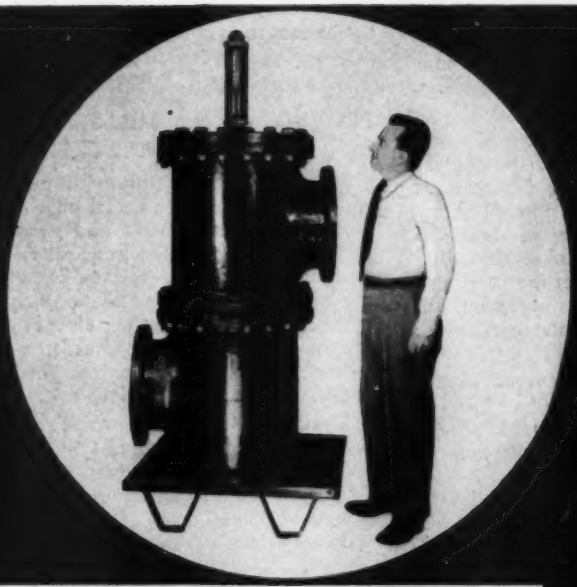
There is little doubt that the paper supply position has become much healthier over the last few weeks, although many paper usages are still held in check by the control and it would appear that the time has arrived for serious consideration of the functioning of the Paper Control. It is felt that present elaborate system of licensing could be considerably reduced. In view of the fact that a number of other Controls have been eased recently, questions have been asked in Parliament concerning the Paper Control. This has brought the response from Harold Wilson, president of the Board of Trade, that time has not yet permitted a consideration of the Paper and Timber Controls, two of the most difficult and intricate Controls, and the need for a thorough investigation into both of these Controls, and consideration as to the first preliminary to streamlining them, is very much in mind.

Another trend of the trade is the monthly increase in the number employed. Hitherto, many employees have been attracted away from the paper and printing industries by the abundance of easy money jobs which are coming to an end. With a speeding up in production at this end, publishers will be able to replace items more quickly and accumulated paper stocks will be reduced proportionately.

Meanwhile, to maintain paper production at its relatively high postwar level, the imports of papermaking materials continue to make good showing

Flow rates of 6200 G.P.M. are measured with the new RATOSLEEVE

High accuracy. . . . .Low pressure loss
Wide flow range. . .Linear calibration
Instantaneous response to flow changes



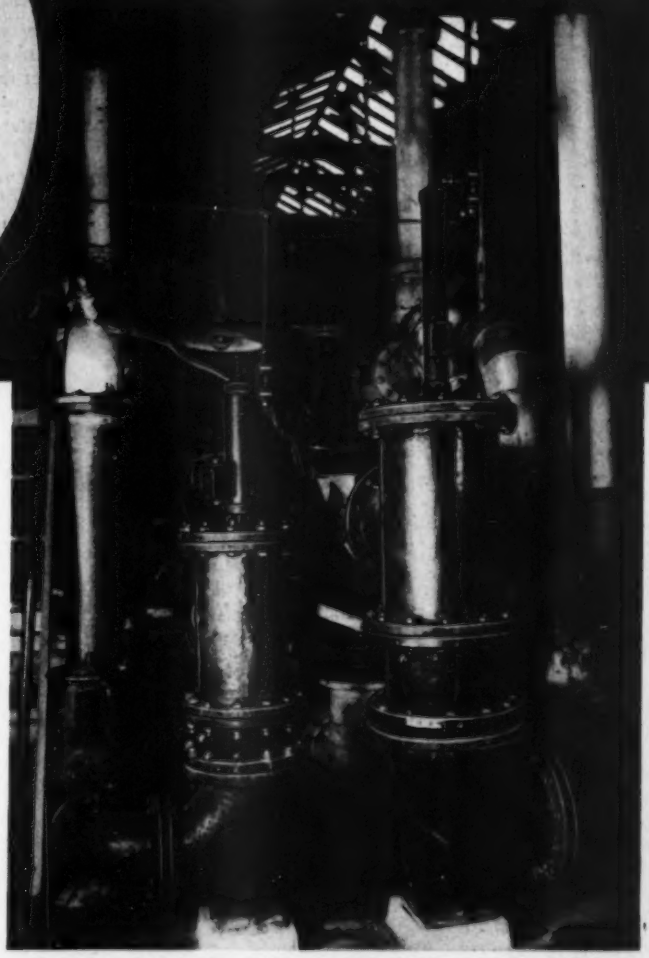
A 20" Direct Flow Rate Indicating Ratosleeve Meter Utilizing Standard Tee Pieces.

The F & P Ratosleeve instrument effectively utilizes all the basic advantages of the area type flow meter for the measurement of large flows of liquids or gases. All this is available at a cost far below that expected for instruments of such large capacity.

THE RATOSLEEVE CONSISTS OF:

1) A tapered metering sleeve designed for bolting between the flanges of two standard pipe fittings.
2) A metering float arranged to move freely up and down in the metering sleeve.
3) A heavy-duty borosilicate glass indicating extension assembly attached to a cover flange.

The Ratosleeve is made for direct reading and for remote reading in recording and recording-controlling types.



These Special Ratosleeve Meters are Controlling the Ratio of Two Slush Paper Stocks in a Pulp and Paper Mill. The Flow Rates are Being Recorded and Totalized on a Remote Ratio Controller.

Write for Catalog 83 for Capacities and Dimensions

FLOWRATOR • FISCHER & PORTER CO.
DEPT. 9L-1F HATBORO, PA.

against 1947. For the period January-October this year the total has been 1,272,735 tons, a net increase over last year of 281,367 tons and represents about 75 per cent of the prewar rate. Chemical wood imports to date total 690,483 tons, an increase of 193,000 tons on 1947 and mechanical wood 247,724 tons, 18,000 up on last year, while esparto grass receipts are in advance by nearly 55,000 tons and total 285,153 tons. This total extra tonnage has been mainly received from Canada, Norway and Finland, Imports of paper and board are down on last year, mainly because lowered receipts of strawboards from Holland. The present total is 413,222 tons against 432,432 tons. In this category, receipts from Sweden are up from 86,674 tons to 111,240 tons. Paper and board exports to date exceed 1947 by approximately 14,000 tons, the total for the present year being 107,574 tons. An indication of the newsprint position is disclosed by the fact that 10,488 tons have been exported against 2,577 tons during January-October 1947. Coated paper exports now stand at 181 per cent of prewar and transparent cellulose wrapping with 7,124 tons compares with 746 tons in 1938.

A further extension of the Bowater Group activities, on behalf of overseas countries, is contained in a report that this group will convert 25,000 cords of Canadian logs and 4,500 long tons of Canadian sulphite pulp into 29,500 tons of finished paper on behalf of the Newspaper Supplies Proprietory of Australia.

▼

▶▶▶ FOR AN ENTIRE WEEK of conference with executives, managers of National Gypsum Company's plants and operations from all parts of the country met in the company's headquarters, Buffalo, New York. Louis R. Sanderson, vice president in charge of operations, presided at the general meeting opening the conference. Group meetings on technical problems were held during the balance of the week.

▼

HUBBS & HOWE ACQUIRES SANITARY PRODUCTS CO.

The acquisition of the Buffalo branch of Sanitary Products & Paper Company, has been announced by Hubbs & Howe Company, Buffalo, New York. The company is a division of Crown-Zellerbach Corporation, operating for 30 years in the Buffalo area as a distributor of sanitary and maintenance items.

Arthur Sullivan has been named manager of the new division and will be assisted by Philip Han. Both were previously connected with Sanitary Products & Paper Company. The same sales personnel will also be retained.

Offices and warehouse will be maintained at the present Hubbs & Howe Company, facilities at 1702-20 Elmwood Avenue, Buffalo 7, New York.

▼

MODERNIZATION PROGRAM UNDER WAY AT PLANTS OF SCOTT PAPER CO.

In order to met strong demands, Scott Paper Company has been engaged in a program of plant alteration, modernization and improvement at all its plants.

At the company's Chester, Pennsylvania, plant, a new Hydrapulper has been installed to handle the increased production volume; a pilot plant for bleaching pulp is now in successful operation; a new Yankee dryer has been installed in one of the paper machines, and a similar installation will be completed before the end of the year.

A new shipping conveyor is now under construction at the Fort Edward, New York, plant where work will begin in January on a new pulp preparation system similar to the one now in operation in Chester. A program for rebuilding one of the paper machines is scheduled for completion about July 1, 1949.

Bids are now being received for the construction of a new building which will house additional finishing equipment at the Cut-Rite division at Sandusky, Ohio.

Work at the company's Marinette, Wisconsin plant is proceeding according to schedule, (P.I. & P.W., October, 1948, pp 1018) and new laboratory facilities will be completed soon.

None of these activities has interfered to any material extent with normal production operations and all plants are continuing to operate at levels higher than in 1948.

▼

COLLINS MFG. CO. GIVES OPTION ON PAPERMAKING MACHINERY & EQUIPMENT

Including an agreement to dismantle and move out the material at his own expense, Karl Ketz, 500 Fifth Avenue, New York City, has an option to buy the equipment, furniture and fixtures of the Collins Mfg. Company mill in North Wilbraham, Massachusetts, for $250,000. The deal includes all the papermaking machinery and stock preparation equipment, but not the hydroelectric plant, heating apparatus and boiler room equipment.

The purchase agreement was revealed when Mrs. Margaret Bast of Longmeadow, Massachusetts, and her brother, James G. Whiting of Holyoke, Massachusetts, trustees under the will of their father, petitioned the Hampden County probate court for authority to buy the $229,104 first mortgage on the plant from the Union Trust Company of Springfield. The trustees own the second mortgage of $184,000. To protect it they propose to buy the first mortgage because it is estimated that proceds of the sale of the property will not be enough to cover both mortgages.

▼

PRODUCT OF N.B. MILLS STILL PRINCIPAL EXPORT

Products of New Brunswick pulp and paper mills reached a total value of $68,000,000 during 1947 and maintained their place as the principal export of the province. The pulpwood products made up a sizable portion of the $706,972,000 worth produced by the industry throughout Canada, an increase of almost 34 per cent over 1946.

During 1947, New Brunswick's five pulp mills used or exported 1,540,000 cords of pulpwood, an increase of 125,000 tons over the previous year. They also used 930,000 tons of pulpwood, most of which came from inside the province.

▼

SWEDEN HAS REDUCED IMPORTS FROM DOLLAR COUNTRIES 40 PER CENT

Sweden has decided on a 40 per cent reduction in imports from dollar countries in 1949 as compared with 1948, but is proposing a plan under which a barter relationship can be established with the United States. No formal proposal, as far as can be learned, has reached Washington as yet, but word from abroad would indicate that the plan is to offer opportunities for United States shippers to sell in the Swedish market to the extent that such sales can be compensated in imports into the United States of Swedish products, of which pulp and paper comprise the larger share.

The Swedish proposal is said to involve the acceptance of Swedish paper at the ruling price in Sweden, plus freight and transportation cost. Difficulty is expected to arise, however, inasmuch as existing law gives the Administration no power to transfer a dutiable commodity to the free list, which is what the Swedish proposal would involve. Imports of pulp under the proposed barter plan might involve application of the Anti-Dumping Act.

Here's How Industry Uses Chemalloy To Resist Corrosion

Where corrosion is attacking your operating equipment, it's a job where you should consider Chemalloy castings. Chemalloy is the alloy specifically developed to resist the corrosive action of fluids and gases under high temperatures.

Illustrated here are typical examples of the work Chemalloy is now doing. For more complete information, write direct to Electro-Alloys Division, Elyria, Ohio

Pharmaceutical

Chemalloy filter drum used in processing penicillin where stainless metal is a must in maintaining purity. (18-8 Stainless)

Soap

Chemalloy valve body. This is one of the first castings to be produced for this user and indicates the experimental work now being conducted for Chemalloy users. (Ni-Resist Type 2)

Power

6500 lb. Chemalloy Turbine Runner used in water to resist oxidizing mineral and organic acids that corrode ordinary metals. (19-9 Stainless)

Food

Chemalloy screw casting used in pineapple processing plant to resist corrosive action of fruit juices. (19-9-Mo Stainless)

AMERICAN **Brake Shoe** COMPANY

ELECTRO-ALLOYS DIVISION
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MINIMUM RESISTANCE TO FLOW . . . Smooth streamlined fluid passage without pockets prevents accumulation of sludge and reduces friction resistance to a minimum.

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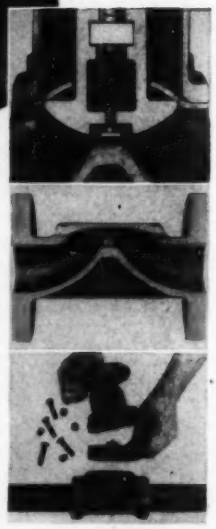
Available in various combinations of valve bodies and operating mechanisms. Write for Catalog 2-S.



GRINNELL

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For the New Year

▸▸▸ COMPETITION has returned to the paper industry. The years of unsatisfied demand for paper are drawing to a close. The sharp upward trend of production is leveling off and the per capita consumption has been about the same for the past two years. A period of stable, if not spectacular progress is in the offing.

Only a few grades of paper, such as newsprint, remain on the scarcity list and backlogs of mill orders largely have disappeared; on the other hand, certain fine paper grades already have weakened considerably. On the whole, production figures in 1949 should tend to fluctuate more in accordance with business activity than they have for many years.

Records made in 1948

In 1948, however, pulp and paper production reached a record high of over 22 million tons. New mills have started and many old mills have modernized. This program of paper industry expansion, while much of it is completed, is still under way. Those mills that modernize should be able to withstand the growing competition, but many marginal mills, reopened during the war, again will fall by the wayside. Nevertheless, there is little indication that the industry as a whole will suffer any major setbacks in 1949.

Paper consumption has continued to grow and reached 26 million tons in 1948 compared to 20.4 million tons in 1941, the last prewar year. Annual per capita consumption for the past two years has been about 340 pounds compared to 307 pounds in 1941. Creation of new paper and pulp products partly has been responsible for increasing consumption, and postwar as well as wartime research has paid dividends in many new uses for paper and board.

Prices of paper were higher in 1948 than in 1947 in contrast to most major industrial products. For the most part, 1949 prices will be lower and will follow the trend of other commodities.

No alleviation is in sight for constantly gaining production costs, and wage increases are not an unlikely possibility. This, of course, indicates somewhat narrower profit margins and is an indication that a general tightening up is in order.

The industry long has recognized the eventuality of getting back to a normal competitive market. Renewed competition, both in selling and in manufacturing, will have many good effects from the standpoint of better quality products, higher efficiencies, and better attention to good business practice.

Predict for Yourself

While both optimistic and pessimistic predictions have been made for 1949 by the innumerable business analysts, it is still necessary for you to make your own individual forecast. Your own particular business and personal problems are not quite the same as anyone else's and you are the only one who understands your own specific case.

Since it is recognized that the paper industry, like all others, isn't sufficient unto itself but depends somewhat on the activity of business in general, the factors relating to all business will certainly affect this industry.

Certain basic facts must be considered in predicting the course of business. Most important of these are concerned with spending policy of the nation. There are three main types of spending: Consumer, business, and government. The economic outlook for the coming year will depend to a considerable extent on these factors.

First, consider consumer spending. Will the public continue to buy next year? Don't go by the talk of your own particular colleagues and associates. Look to the buying public, the ultimate consumers. What will they buy? Automobiles? Houses? Home furnishings? Clothing? Luxuries? If you believe they will or will not continue to buy a considerable quantity of such goods, then you have a clue to general business activity because consumer goods and services are the end product of our economy. The prospect for consumer goods can be the stimulus either for expansion or contraction of business operations from raw materials to final sales.

Business Spending

Next take business spending. Will your company and others continue to appropriate and spend money for plant improvements and additional capacity? So far, it seems that many paper manufacturers are going ahead without much curtailment of plans for modernization. Other industries, such as steel, appear to be moving ahead with long range plans for expansion and modernization for the future.

Examine the situation carefully. Look around and see if many companies have tabled plans for modernizing and consequent spending. Find out what business experts and industrialists are saying about this and you'll have a good indication.

Government Spending Won't Drop

When it comes to government spending, it seems quite clear that there is little chance for a slackening off. Defense will cost as much in 1949 — probably more than it did in 1948. Foreign aid shows little sign of abating since the Marshall plan in one form or another appears to be solidified.

Ordinary expenses of government apparently won't be cut. Instead they appear to be going up. State and municipal spending shows no signs of slackening either. Practically every phase of government operation will require greater expenditures. Public works projects are being widely planned and this all adds up to a sizable amount of government spending.

When you have added up the probable effect of these three types of spending, you will then be in a position to compare the new year with the old and you should be able to chart your course more effectively.

BETWEEN THE LINES

Where Do We Begin?

▶▶▶ WITH THE GOOD-WILL train already leaving a trail of smoke, some of us relax into a pause of introspection. From the chorus of good wishes and pleasantries about resolutions for the New Year, I tried to recall some comments heard during the Holiday festivities that would stand out from the traditional truths we have accepted since the first Christmas was observed on the earth. There didn't seem much that was different or new, except for one thought expressed by a commentator on one of the radio networks. Nothing really new about the idea; most of us would listen to its recital with the same complacent manner we effect when listening to platitudinous comment. But whether it was done up in a new kind of package, or whether my listening ear was not quite so tired as it sometimes is, this inspirational truth was put in such a way that it came to me over and over again.

This, I believe, practically quotes what the speaker said: "War creates unity; peace promotes discord and contention." It must have been the startling paradox of this comment that made me listen to what the man said. He sketched it thus: In time of war, people have one goal; the thing they are fighting for must be won and the only way that can be done is to do it together. But when the war is over, each person retires into his own corner and expects to take up what he considers is a peaceful existence. That is where the trouble begins. When personal happiness is sought, men necessarily differ with one another. Simple? Of course, it is. In one way or another, all of this has been taught and written for the past nineteen hundred and forty-eight years. Likewise, a good many wars have been fought in that time with the same result, except that each time the aftermath seems to require a stronger dose of the newest antidote. Many people now believe that the last two wars have made the human race immune to shots. And people won't accept the great truth that the only cure for this differential epidemic must germinate within their own souls.

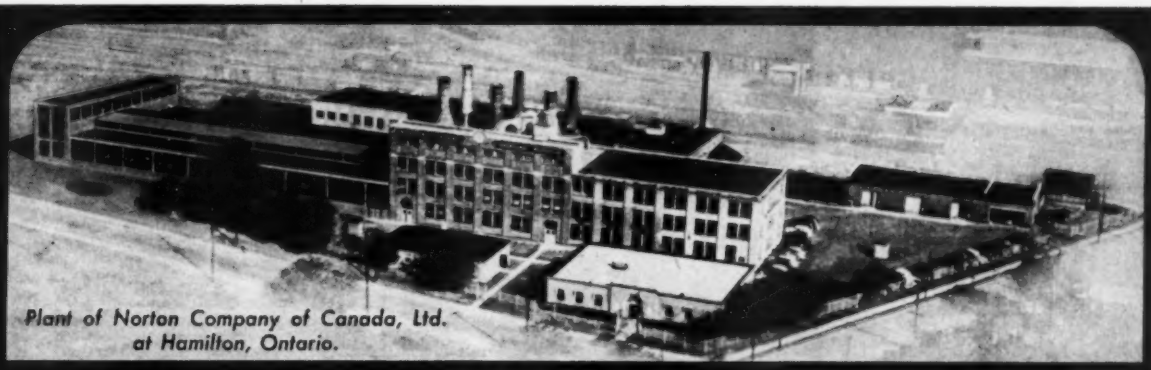
Yes, by the time you read this page again, many of your New Year's resolutions will be complaining to the tinsel and Christmas tree ornaments that they must sleep until another Holiday season, then come out and do it all over again. Which reminds me that it is an old Chinese custom to pay all one's debts on New Years day and start the year with a clean slate. The Chinese started many things. They made the first paper, and could be they were the original resolvers. Just now that ancient country is far from peace, with even thousands of its students refusing to attend school and preferring to join with invading forces.

Well may we ask: "What is a New Year?" *We really begin a new year each day.* And about the only daily celebrating we can do is to start a new year each morning over our breakfast coffee.

▶▶▶ EACH NEW ISSUE of the accepted dictionaries and other reference books reminds us that our vocabulary is more and more subject to addition and subtraction. New discoveries and new events require expressions no longer covered by any words in the books published a decade or more ago. Here's a new one for the book. Many of our grandfathers were fishermen. Then some of our fathers became piscatologists. But that was only a point of etymology. Here is the latest Fish Flash! Experiments at the University of Wisconsin prove conclusively that a little fish called the Bluntnose minnow, has manifested such a keen sensitivity to water containing phenol that scientists have trained these small minnows experimentally, and there is some expectation that they may be trained to test, commercially, industrial waste *(Chemical & Engineering News)*. . . . See what I mean about new words. A research chemist who would specialize in training valuable little fish for testing could hardly be called a piscatologist. He will need a new name.

▶▶▶ PERSONALITIES and occupations in technicolor may be among us before many more Holidays pass by. Fantastic, of course, but it really has passed the figment stage. A French painter has styled himself chief of a new movement interested in psychological problems of painting. He fits in with a psychological movement under way in the schools of our country to experiment with scientific coloration. And so the "dye" having been cast, one color expert has charted certain colors which do specific jobs best. He does this by grouping sixty hues, challenging laymen to identify them by functional and emotional category. A new and different "Eye-Q" test *(Dyelines and Bylines,* American Cyanamid Co., Calco Chemical Division). . . . It's catching on to such an extent that the drab appearance of men's apparel is about to be glamorized. A New York woman designer has put on a fashion show demonstrating what she thinks men should wear according to occupation. Gas station attendants were given nile green shirts; the milkman appeared in a corn-colored shirt with black-brown trousers. Hospital surgeons paraded in "calm blue." The designer apparently has not yet decided whether these uniforms will be only occupational . . . Shades of reason—How could a doctor escort a redhaired girl in a seafoam green gown if he must wear his "calm blue" socially. The designer also has not assigned colors to bankers, editors, lawyers, and realtors —but she's working on it.

—By Bessemer

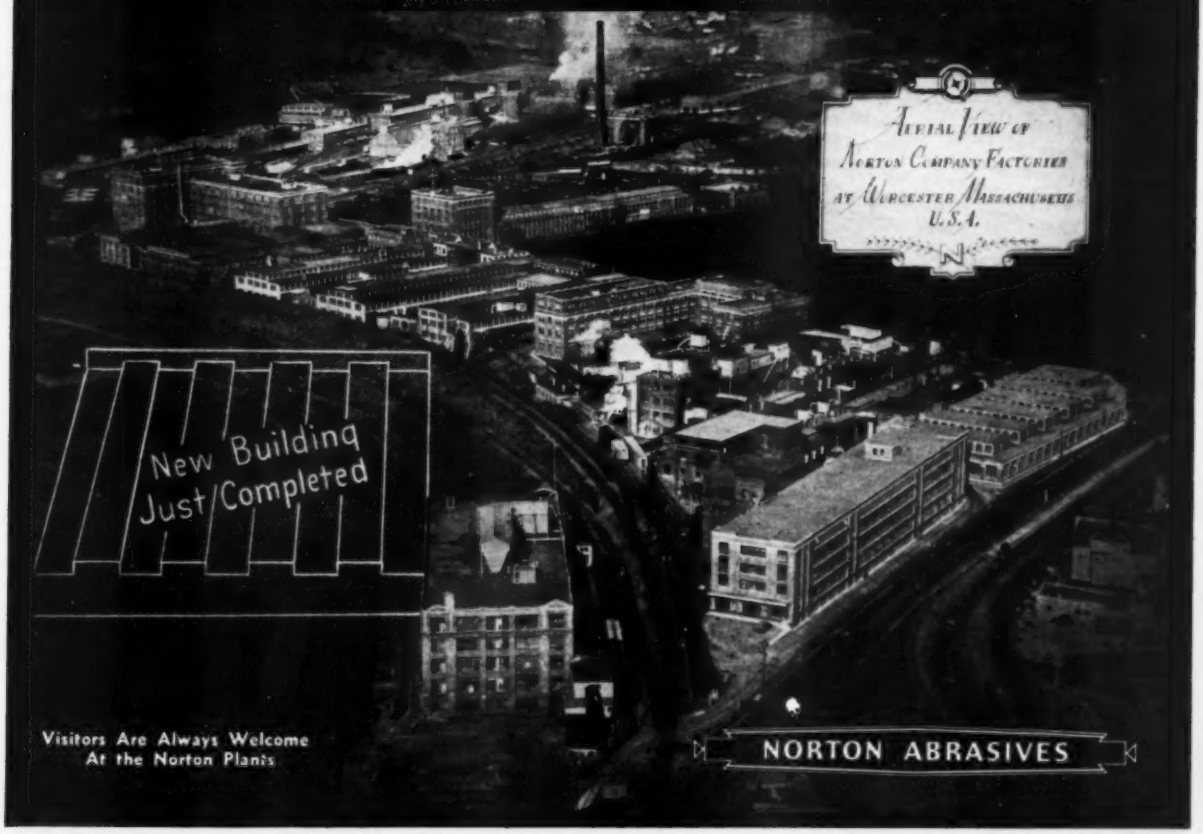


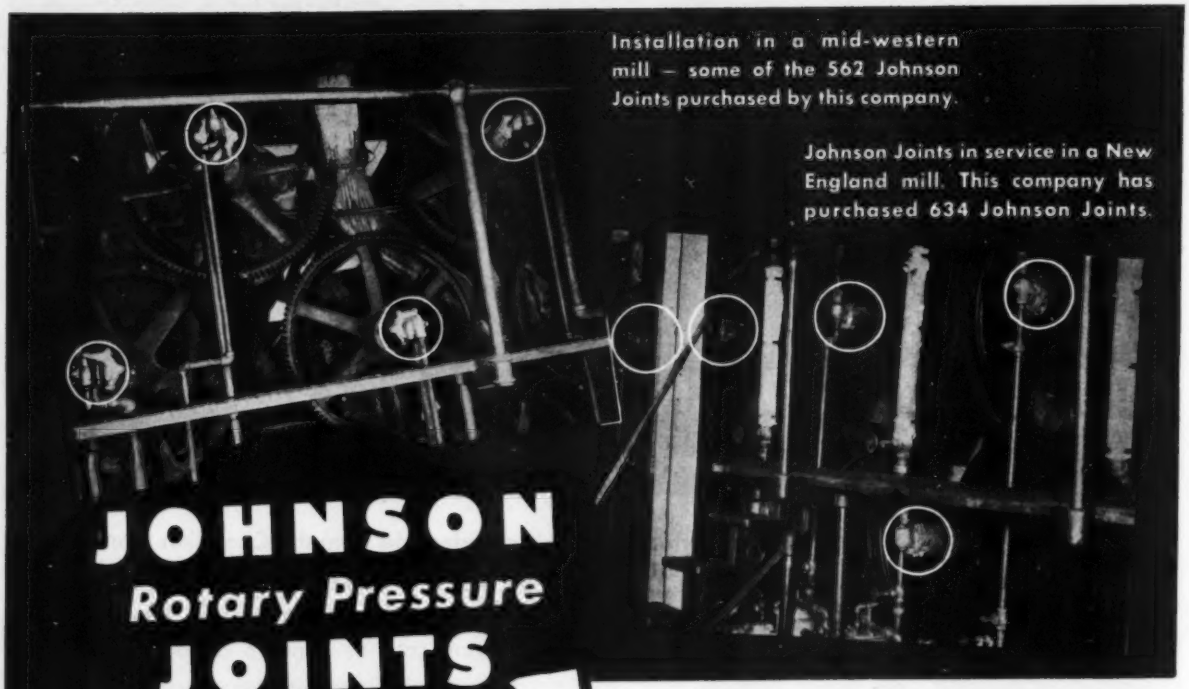
Plant of Norton Company of Canada, Ltd.
at Hamilton, Ontario.

TWO BIG PLANTS
Are Producing NORTON PULPSTONES

FROM the main Norton plant at Worcester and from the Canadian plant at Hamilton, Norton Pulpstones are being shipped at the greatest rate in their history — throughout the United States and Canada, to Mexico and South America, to the Scandinavian countries and to all points in the British Empire.

And the fact that there are *two* large Norton plants, each supplementing the other, assures uninterrupted service. Pulpstones can be supplied from either plant.





Installation in a mid-western mill — some of the 562 Johnson Joints purchased by this company.

Johnson Joints in service in a New England mill. This company has purchased 634 Johnson Joints.

JOHNSON Rotary Pressure JOINTS

Knock the "stuffing" out of trouble . . . Put Production "on the double"

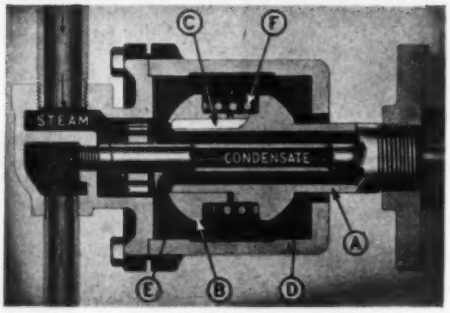
Take the verdict of the paper industry as a whole, and you'll get a pretty good idea of the merit of Johnson Joints.

You'll find them serving in hundreds of mills, all over the world. Leading machinery manufacturers have adopted them as standard equipment. Over two hundred mills have completely equipped one machine, and in many cases several machines, with Johnson Joints. An equal number are well under way on similar programs.

The reasons are two-fold. First of all the Johnson Joint literally knocks the stuffing out of stuffing box troubles. It is completely packless, self-lubricating, self-adjusting and even self-aligning. If it did nothing more the Johnson Joint would soon pay its own way. In addition it speeds production by ending many causes of machinery shutdown and by facilitating more efficient methods of syphon drainage.

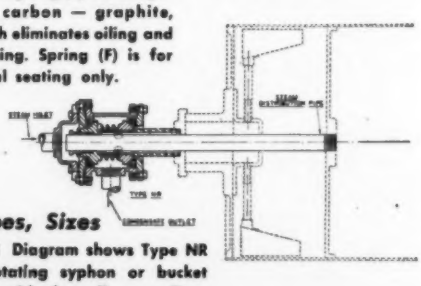
Johnson Rotary Pressure Joints are available now for all installation requirements. Standard Type B is shown in cross section at right. Type NR, one of many other arrangements is diagrammed below.

Get all the details . . . write for fact-filled literature!



Here's How It Works . . . . . .

Nipple (A) is connected to roll or drum. Sliding collar (B) is keyed to nipple at (C), but slides loosely over it so pressure can fill entire housing. This pressure becomes the sealing force, by pressing seal ring (D) tightly against nipple. Both seal ring and bearing ring (E) are of special carbon — graphite, which eliminates oiling and packing. Spring (F) is for initial seating only.



Types, Sizes for all Needs **Diagram shows Type NR Johnson Joint, used with rotating syphon or bucket drainage where pipe rotates with the roll, as well as rotating steam supply pipe.**

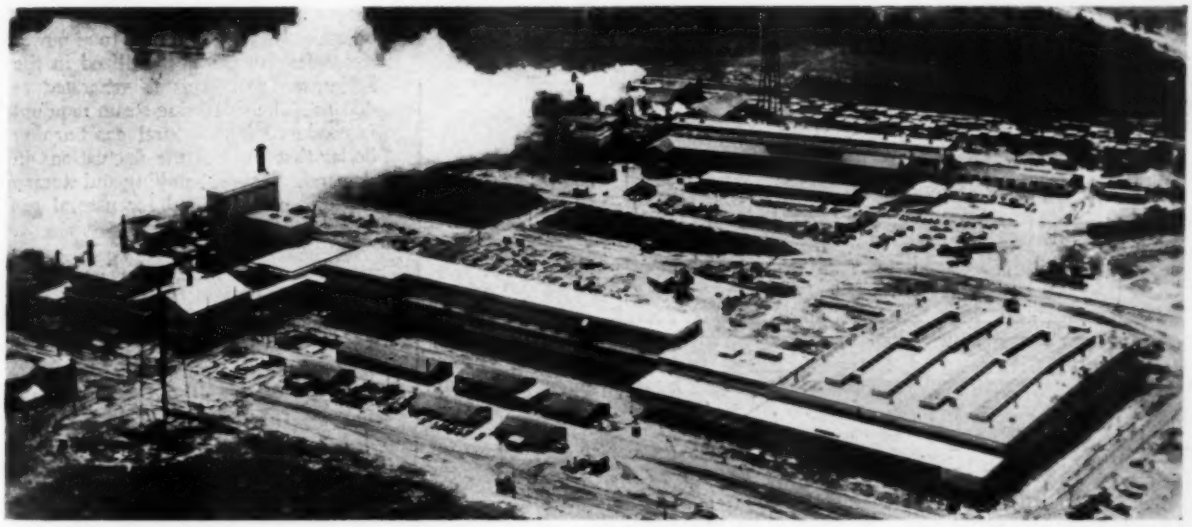
Product of The Johnson Corporation

845 WOOD STREET, THREE RIVERS, MICHIGAN

ROTARY PRESSURE JOINTS • COMPRESSED AIR SEPARATORS AND AFTERCOOLERS
DIRECT OPERATED SOLENOID VALVES • "INSTANT" STEAM WATER HEATERS

THE PAPER INDUSTRY
and PAPER WORLD
JANUARY 1949

Air view of Alabama Pulp and Paper Company, Pensacola, Florida. In the background is the plant of Florida Pulp and Paper Company. These two plants give St. Regis Paper Company (parent company) an integrated kraft project



POWER PROBLEMS
in a Modern Kraft Mill

S. A. BOBE, Industry Engineering Supervisor
Westinghouse Electric Corporation, Atlanta, Georgia

R. G. SEIP, Vice President and Chief Engineer
Alabama Pulp and Paper Company, Pensacola, Florida

▸▸▸ THE CHOICE OF POWER equipment permitted in the building of a complete new pulp and paper mill reflects the advancement of modern design. Advantages thus obtained permit maximum continuity of service and lower operating costs. When a complete new mill is being designed and built, an ideal opportunity is presented to evaluate and utilize these modern advantages. A most recent example of such design is the new Alabama Pulp and Paper Company mill at Pensacola, Florida.

Steam Power

The source of all power in pulp and paper mills today is steam. Electric power is a by-product from the large quantities of steam being required for the preparation of pulp and for the drying of the paper in the paper machine. Process steam demands require considerable quantities at 150 psi for pulp cooking and blowing. Additional quantities are required at 50 psi or lower for drying, water heating, evaporation and other miscellaneous uses. This latter pressure is determined by mechanical limitations of paper machine dryer cylinders. By generating this required steam at higher pressures, single or double extracting turbogenerators can be used as reducing valves and produce low cost electric power. However, power demands are usually greater than can be supplied by process steam alone so condensers of some rating below the turbine capacity are usually used. In most kraft mills, approximately 40 to 50 per cent of the total power is produced by condensed steam.

To generate electric power for this mill, two duplicate turbogenerator units were chosen with a rating of 5000-kw, 80 per cent p-f, 2300-volt, 3-phase, 60-cycle with single extraction at 50 psi. Surface condensers of 4000 square feet capacity equal to 75 per cent of turbine rating are used with each machine. Steam is supplied at 400 psi and 650 Fahr. total temperature. Possibly a better choice of turbines would have been one condensing and one extracting unit. However, two duplicate units were chosen as it will permit approximately 70 per cent of mill output with only one unit operating.

An interesting difference from many similar applications is that these turbines are not provided with 150 pound steam extraction. This omission does permit of better efficiency in the turbine. The 150 pound steam requirements, principally for the cooking of pulp, are supplied by a low pressure boiler equipped with a bark and refuse burning furnace. This boiler is located near the barking drums and wood yard which are the principal sources of wood burning refuse. The arrangement is primarily a convenient and economical disposal of bark and wood refuse. Steam obtained from this boiler as a by-product provides almost the total requirements at 150 psi for cooking. Cooking cycle normal and peak demands do not permit uniform utiliza-

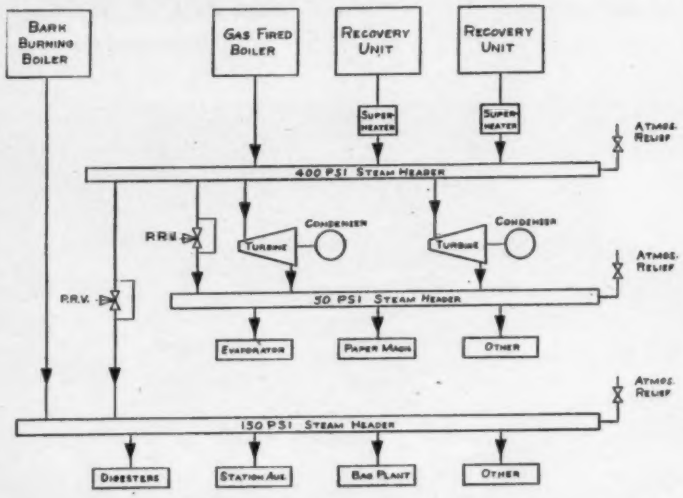


Fig. 1—Steam flow diagram for a modern pulp and paper mill

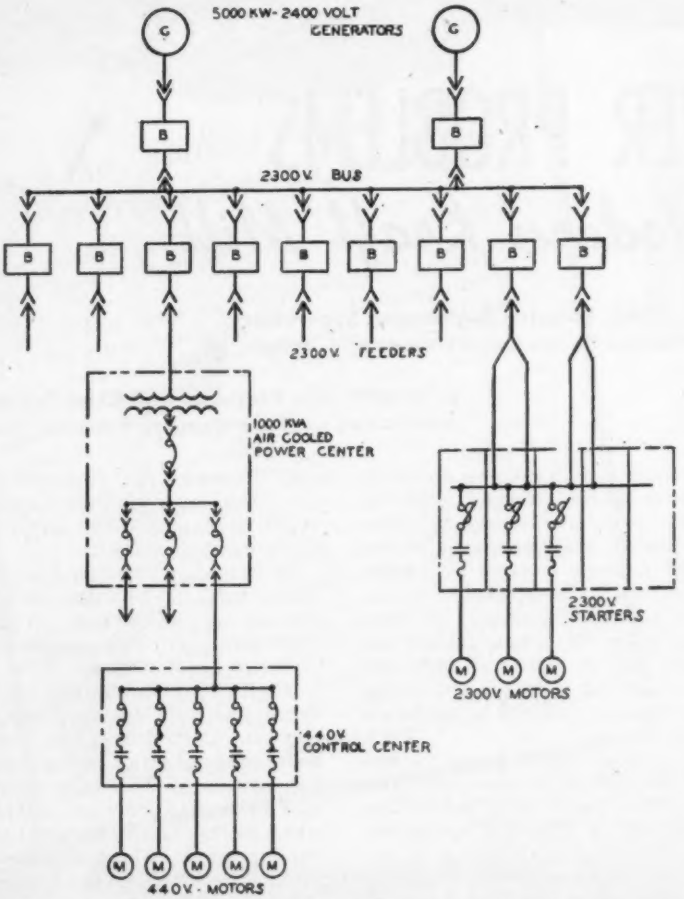


Fig. 2—Schematic of electrical distribution system of the Alabama Pulp and Paper Co.

tion of the steam output of this boiler. Peak demands are made up through a reducing valve from the 400 psi header. Any surplus during normal demands is in turn fed through a reducing valve into the 50 psi header.

In the pulp mill, two chemical recovery units produce through their operation 45 per cent of the total power steam from waste heat utilized in the boiler sections. This is generated at 400 psi. The remaining steam required is produced in a natural gas burning boiler that handles the fluctuations in demand. Fuel oil handling and storage facilities are provided for natural gas standby.

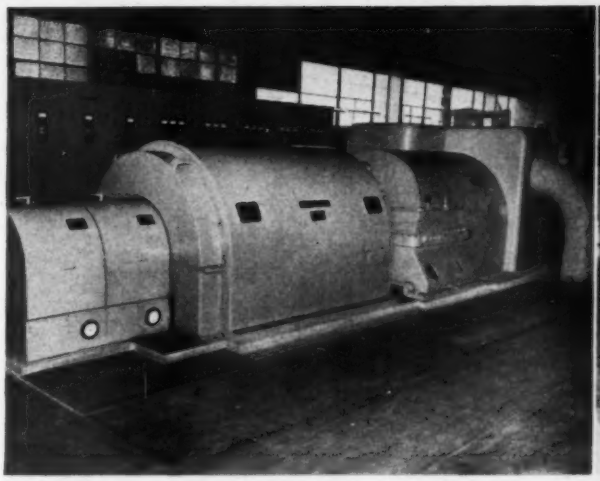
Although the arrangement described may be typical for any mill, it is based on the Alabama Pulp and Paper Mill with a capacity of 250 tons of kraft paper in a 24-hour day. The steam generating capacity of this plant is 230,000 pounds of 400 psi steam per hour of which 140,000 pounds is from the gas fired boiler and 90,000 pounds from the recovery boilers. The bark burning boiler can provide 40,000 pounds of 150 psi steam per hour. With this arrangement, it is possible to produce paper with a steam consumption of approximately 22,000 pounds per ton.

Electric Power

Considerable thought was given to the study of whether 2300 or 4160 volts should be used for this mill. The higher voltage has the advantage of permitting larger generator capacities for given size breakers, smaller feeder copper and better voltage regulation. The higher voltage involves greater initial cost for motors and control but returns a saving in future costs should additional electrical installation be required for plant expansion.

The opportunity to have interchangeable equipment with the existing adjacent Florida Pulp and Paper Mill was the deciding factor in going to 2300 volts. Future expansion could be provided for without excessive expense with this 2300-volt system as the capacities involved are on the border line of economic choice between the two voltages.

The turbogenerator rating was primarily determined by the short circuit interrupting capacity of the switchgear at 2300 volts. Two 5000-kw, 80 per cent p-f generators are the maximum that can be handled on these circuit breakers without reactors or other means of limiting fault current. Although this total generating capacity is somewhat higher than the estimated load, it appeared desirable to utilize the maximum circuit breaker interrupt-



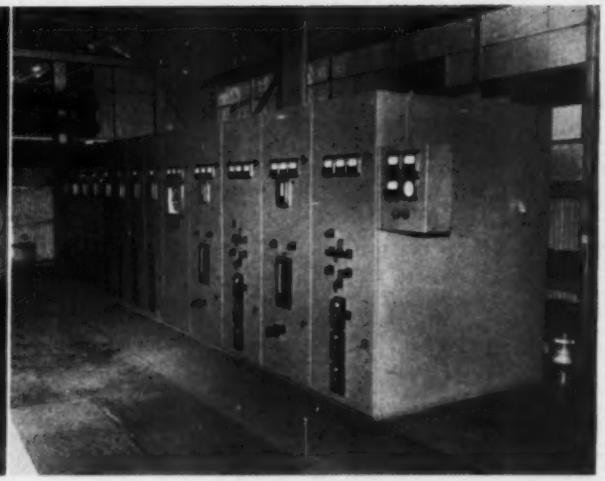
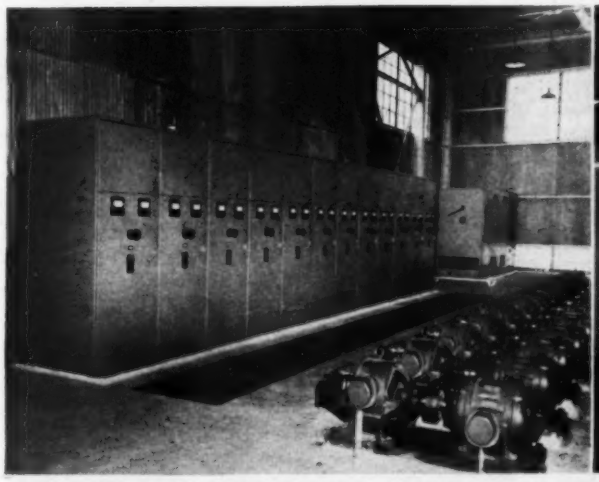


Fig. 3 (left)—5000-kw power turbine . . . Fig. 4 (right)—2300-volt powerhouse switchgear



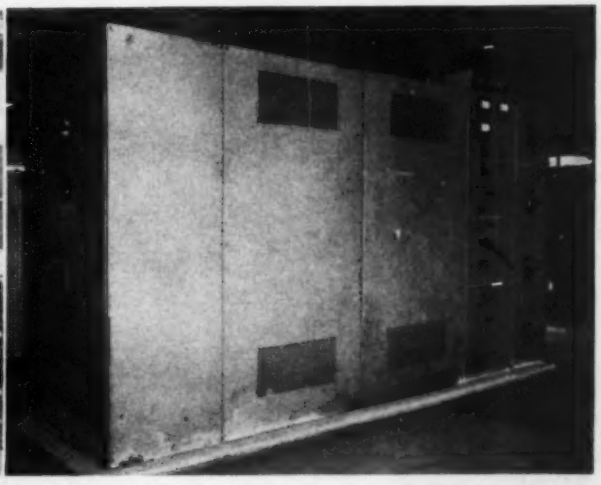


Fig. 5 (left)—2300-volt Jordan control . . . Fig. 6 (right)—1000 kv-a, 2300/440 volt air cooled power center

ing capacity available and provide some load reserve for future changes.

Past experience has shown that paper mill loads always increase. With this in mind, the turbines were purchased with sufficient steam capacity to deliver full generator 6250 kv-a rating in kilowatts to a 100 per cent power factor load. To obtain a high power factor load, all large motors are 80 per cent leading synchronous. This includes the twelve 350-hp Jordan motors, a 300-hp pump motor and the 1850-hp m-g set motor. These large motors provide the corrective kv-a required for the large number of smaller induction motors used.

All motors of 75-hp rating and above are designed for 2300-volt service, and those below, for 440-volt service. Motor enclosures are splash proof, totally enclosed non-ventilated or fan cooled except for m-g sets and Jordan motors. Special splash housings are built for the Jordan motors to protect them from hosing or pulp spray. A considerable number of gearmotors are used for slow speed drives such as conveyors and agitators. All washers, save-alls and thickners are driven by adjustable speed direct-current motors with d-c power supplied from individual adjustable voltage m-g sets.

The mixing pump drive used with the paper machine in this mill is an interesting departure from usual practice in that the pump speed may be varied. Past practice was to use a constant speed motor coupled direct to the pump and stock flow to the paper machine controlled by throttling a valve. This pump has 24,000 gpm capacity and is driven by a 300-hp synchronous motor through a magnetic coupling. Speed variation is obtained by changing the excitation to the magnetic coupling. This exciting current is supplied by an electronic regulator, the output being controlled by a liquid level regulator on the paper machine head box. Complete control of this and all other paper machine auxiliaries is provided at a main control board located on the operating side of the first press.

Power house switchgear on this installation included only that required for 2300-volt power distribution. All 440-volt switchgear was supplied with power centers. Included in the powerhouse are the following metal-clad units with electrically operated 15,000-volt oil circuit breakers:

2—5000-kw generator units
2—Exciter and voltage regulating units
1—Synchronizing panel
1—Totalizing and ground detector unit
9—1200 ampere mill feeder units as follows:
2—Jordan room feeders
1—Paper machine supply
1—Jordan room 1000-kv-a power center and nash pumps
1—Well line
1—Wash room 1000-kv-a power center and screen room
1—Boiler room 1000-kv-a power center

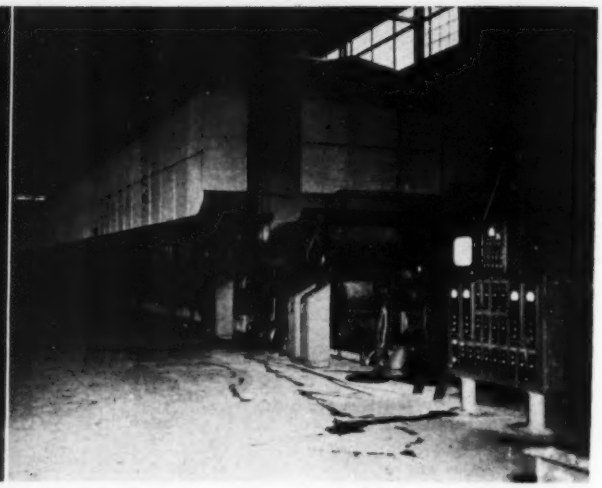
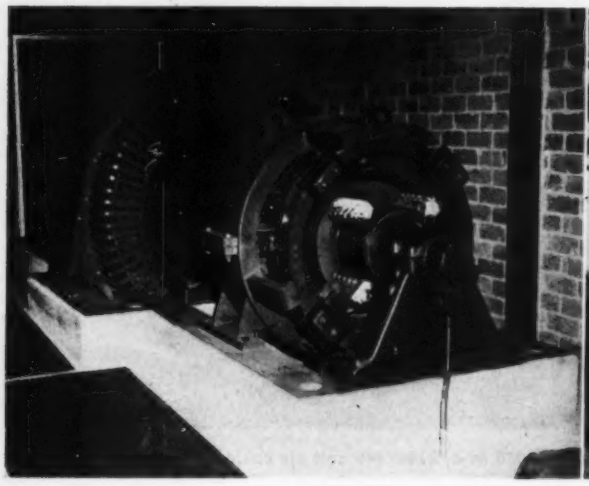


Fig. 7 (left)—440-volt control center . . . Fig. 8 (right)—Operating side of paper machine showing wet end control board



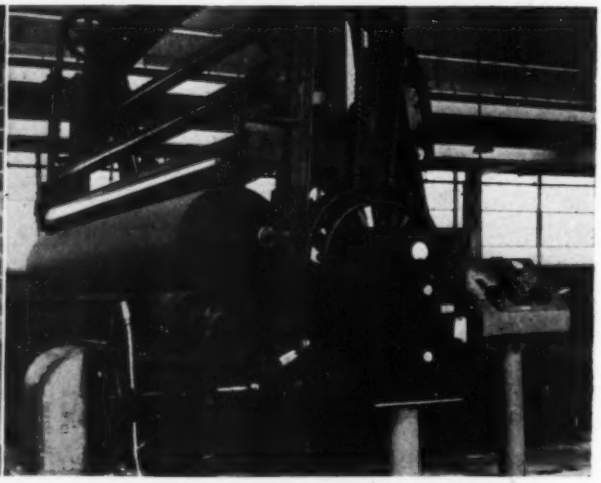


Fig. 9 (left)—1250-kw m-g set for paper machine drum . . . Fig. 10 (right)—Operating side of winder

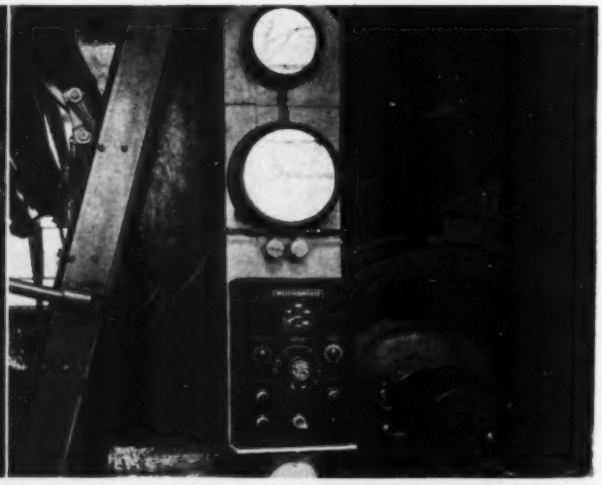


Fig. 11 (left)—Paper machine sectional drive motor from wet end . . . Fig. 12 (right)—Paper machine main control station

1—Compressor, boiler and recovery rooms
1—Bag plant 750-kv-a power center

This switchgear provides metering and protective relays with differential protection on generator circuits. Feeder circuits are protected by induction type overcurrent relays with instantaneous short circuit trip attachments. The inverse time element provides overload protection but prevents tripping on momentary overloads such as motor starting currents. The instantaneous trip attachment provides short circuit protection to clear such faults as quickly as possible and minimize system disturbance or feeder circuit damage.

The distribution of 2300 volt power is conventional with radial feeders to the various load centers throughout the mill. These load centers consist either of groups of 2300 volt motor control cubicles or power centers consisting of air-cooled transformers and switchgear for 440 volt supply.

Motor controls (2300-volt) include high interrupting capacity disconnect fuses for short circuit protection. These clear faults very quickly, thereby providing protection to motor circuits and motor starters. The starters themselves are magnetic oil immersed contactors with thermal overload protection. The only exception is the starter for the 1850-hp motor on the paper machine m-g set which uses an oil breaker due to the high current required. All motors in this mill including the 1850-hp m-g set motor are linestarted at full voltage.

The problem of 440 volt power distribution has always been a major one in paper mills due to long distances involved. The solution in this mill has been a departure from past paper mill practice. Instead of using oil filled outdoor transformers located near the power house with resulting long 440 volt feeders, air-cooled, power centers of 1000 kv-a rating each are located at the load centers inside the plant.

These power centers include 1000 kv-a air cooled three-phase transformers and drawout type 440 volt air circuit breakers factory assembled as a complete unit. The advantages of this arrangement include elimination of 440 volt switchgear in the power house, avoidance of long heavy 440 volt feeders, better voltage regulation of 440 volt supply, lower feeder loss and a great reduction of wiring and conduit as the transformer is in the center of the load. Lower installation cost results as the transformer and low voltage switchgear come completely factory assembled, connected and tested. The power centers have provision for addition of forced ventilation to permit increasing their rating by 25 per cent.

Fig. 13—Paper machine sectional drive motor from dry end

The low voltage switchgear with the power centers includes meters for circuit load indication. The air circuit breakers have instantaneous magnetic short circuit trip for fault protection and inverse time protection for overloads.

Individual 440 volt starters are of combination type including an air circuit breaker for disconnecting and short circuit protection. A magnetic contactor with thermal overloads provides motor control and protection. In line with modern practice, these starters are grouped in self standing control centers. This construction has advantages of ease of installation and maintenance. Spare space is provided for future changes or additions. The control centers are received completely assembled and wired with terminal boards to which incoming motor and pushbutton leads are connected. Since this mill has approximately 300 motors, the saving in installation labor as well as improved appearance with the use of control centers is very obvious.

Paper Machine

The paper machine in this mill is a 210-inch fourdrinier with two suction presses, sixty 60-inch diameter dryers, two calender stacks, reel and winder. Speed range is 333 to 2000 fpm with the latter being the highest yet provided on a machine of this type.

The paper machine drive chosen is the latest Westinghouse design sectional drive with full electronic section speed regulators. This choice was made in order to provide precision of control for the wide speed range over which this machine is to operate. Modern operation also requires exact knowledge on how each section is performing as to load taken. This permits anticipation of machine troubles such as bearing seizing as well as better process control. The sectional drive includes load indicating instruments on each section to give this information.

Power supply for the d-c section motors is obtained from a three unit m-g set consisting of an 1850-hp synchronous motor, a 1250-kw main d-c generator and a 1200 ampere capacity starting generator. The main generator maximum voltage is 600 which corresponds to 2000 fpm paper speed. Slower speeds are obtained by reducing the generator voltage.

Section d-c motors are forced ventilated with filtered air to permit constant torque loading over the complete speed range. The motor ratings are as follows:

Couch	400 hp
2 Main Presses	125 hp each
Smoothing Press	50 hp
4 Dryers	200 hp each
2 Calenders	250 hp each
Reel	75 hp

Each of the section motors has individual magnetic control. These are all assembled together on a main control panel board located in the control room with the main m-g set. This control provides the required operations for each section motor including:

1) Inching
2) Slow speed operation for washing wet end sections
3) Starting and stopping of any section independent of others
4) Controlled acceleration and deceleration to start and stop the sections as quickly as possible without exceeding the safe limits of the electrical or mechanical components
5) Reversing of the calenders to permit quick removal of wraps

6) Customary overload and field protection

This control board also includes the main m-g set starter, main and starting generator air circuit breakers, and a motor operated rheostat for setting the main generator voltage for the paper speed desired. Generator voltage and paper speed are held accurately at the desired value by an electronic voltage regulator. This regulator matches the desired generator voltage against a battery reference and makes any correction necessary by changing field current of the main generator exciter.

Accurate speed control of each section except the reel is maintained by an electronic speed regulator. This is accomplished by measuring the section speed with an a-c tachometer generator called the cue tachometer, allowing for the desired draw adjustment and then matching this against a common reference tachometer. All section speeds are referred to this same reference tachometer. Any very minute error in speed shows up as a difference in voltage which is amplified and a correction in speed made by changing the section motor field current. The a-c tachometer generators used are of the inductor type having no brushes or slip rings to introduce error. They are coupled to each of the section motors.

All the section electronic speed regulators with one spare are mounted in a common cabinet in the control room.

Operators control stations are provided for each section and a master station for the whole machine. The section stations include Start-Stop-Inch pushbuttons, a calibrated draw adjusting dial and an ammeter for load indication. The master station includes a Slow and Fast pushbutton for changing the machine speed, a rheostat for automatic speed setting, an emergency stop button to stop the complete machine, and an fpm paper speed indicating tachometer.

The paper machine winder operates at a maximum of 4000 fpm. This corresponds to common practice of winder speed rating being double that of the paper machine. The winder drive includes a d-c motor with a mechanical air-controlled backstand brake. An adjustable voltage m-g set provides power to the motor and permits a wide range of operating speeds. Smooth and fast acceleration and deceleration is obtained by the use of current limit and speed controlling Rototrol rotating regulators. These regulators are small d-c generators with special fields to make them very sensitive to values of current or voltage being regulated.

This new mill has now been in operation for several months. Experience has proved that careful study and planning for the use of modern equipment results in desirable low cost of steam and electric power per ton of paper.

Safety *IS* Your Business*

JAMES S. WHITE, Safety Director
Fansteel Metallurgical Corp.

▸▸▸ SAFETY IS PART and parcel of a job, every job, and not something extra to be occasionally taken out, dusted, shown and then put away until the next major accident wakes us up again.

Many employees don't want to report accidents. Some feel guilty and don't want to confess inattention or poor judgment. Some foremen, by improper investigation in injuries, actually discourage people from obtaining first aid.

There are many conditions or situations, due to congested work areas, due to poor layout of equipment or buildings, or due to improper tools, where it seems there is nothing else for the employee to do except get hurt.

Most obstacles can be removed or corrected when they are clearly understood. If it is inattention, lick it by action. If it is incredulity, disperse it with truth. If it is poor housekeeping, clean it up yourself, if necessary. If it is a dangerous machine operation, guard it to eliminate damages.

To promote safety consciousness, install safety measures and devices, and reduce the accident rate, a realistic attitude must be taken for overcoming the variety of obstacles that are ordinarily encountered. First, the safety man himself must have a clearly defined purpose. He should have some simple philosophy to carry him through argument and enable him to resist such statements as "accidents run in cycles . . . accidents are due to carelessness . . . people learn only from experience . . . if an accident is meant to happen it will happen," etc.

The simplest philosophy that I can determine is: (1) No man wants to get hurt; (2) Every man is entitled to a safe place in which to work; (3) Every man should consider his safety as part of his job; (4) Accidents are unnecessary, wasteful, and denote inefficiency; and (5) Accidents are caused and they don't just happen.

Two Kinds of Problems

There are thousands of obstacles to industrial safety, but I believe they can be divided into two classes, namely, (1) personal obstacles, and (2) impersonal obstacles. However, investigations of accidents seldom show just one cause. At least one-half of the time, corrective action has to be applied on both a personal and impersonal obstacle.

The first class can be described by almost any word beginning with "in." The more common ones are inattention, inexperience, indifference, inaction, indecision, etc.

The second class, or impersonal obstacles, includes machinery, tools, equipment, materials, objects, buildings, floors, doors, etc., of a general environmental nature which, one way or another, may be traps waiting an unwary worker.

It's Your Job

Suppose you suddenly found yourself as safety director amid unfamiliar operations and out in the plant you find the foremen and employees indifferent to your suggestions and recommendations. Everything you suggest or recommend has already been said or thought of but nothing was ever done about it and they don't think you will be around very long anyway.

Your best bet in a situation like this is to make a written outline of a safety program. Make it a simple program of your proposed activities for the next six or twelve months and make sure it is one that you can handle. Make it one in which most of the personnel

(*) Adapted from a paper presented before the Western Society of Engineers, April 20, 1948.

can participate. One of our obstacles in safety work is making the program too inclusive and too complex. You can always add to a program if necessary.

Our first program consisted of just three essential items: accident reporting, safety committees for departments, and distribution of as much safety material as we could handle without waste.

We discarded the old three-page accident report and submitted a report with only five questions. (1) What was the employee doing at the time of injury? (2) What was the unsafe practice? (3) What was the unsafe condition? (4) What corrective action was taken immediately? (5) What other corrective action should be taken? Answers to these questions were usually turned in promptly.

Where Do They Strike?

Severity of injuries depended upon luck. However, we were checking only accidents where they were serious enough to require medical attention. We decided to attack it by screening all injuries no matter how trivial. We picked out all those of a lost-time type and notified the formen each time one occurred. By the intelligent use of this information by safety committees, we actually predicted how and where some of the lost time cases would occur.

Carry Out Your Program

Have you ever tried to set up a recording system for the injuries in your plant? A large number of employees do not want to report at all. There are still some foremen, by careless attitude, and improper investigation of injuries, who actually discourage people from going to first aid. There are some employees who do not want to give information to the nurse because they feel guilty and do not want to confess their inattention or poor judgment which preceded the injury. We overcame these obstacles by advertising the necessity of prompt reporting of injuries. We obtained posters and placed them in conspicuous places. We secured safety films on the subject of infection and showed them to the employees. We explained to the departmental safety committee men the need for accident data from which we could make summaries.

The second essential point of my first program was establishing safety committees. We set up a central or executive committee, and since each department had different operations, we also set up departmental committees. Insofar as possible, the safety needs of a department were handled by its committee. This furnished a channel both from employee to management and from management back to employee. By taking positive action on recommendations of the safety committee, management helped restore confidence that had been lost through previous half-hearted efforts. Over 200 safety recommendations have now been carried out in a single department.

The third term of our first program had to do with educational material. We displayed or distributed posters, booklets, pamphlets, inserts and instruction cards—not on a wholesale basis, but when and where accident summaries indicated. If our accident summarizes showed a high percentage of delayed reporting of cases in a particular department, we would put on a campaign in that department, with films, posters, and exhibits. We would investigate a number of the cases and ask for co-operation from the individual employee. This never failed to secure results.

We found many ways to advertise safety. We used our intraoffice envelopes to carry a safety message. We used identification signs to carry a safety message. We also maintained a safety record board showing how a department stands, and we also put large numbers on the board to indicate the number of days the entire plant has operated without a lost-time accident. In addition, we used other materials such as homemade pay roll inserts.

Whose Indifference

Have you ever heard a foreman say, "Well, I tell them to be careful and I point out the hazards, but they get hurt anyway. It seems they get hurt of pure cussedness. They don't pay attention. They are indifferent." Have you ever considered that this may not be indifference on their part but on yours? Or, perhaps, they were indifferent because we made it too difficult to do the safe things.

I recall an accident. A ditch had been dug across the plant yard to put in a new water main. This ditch was laid across a pathway. This path was a shortcut taken by some of the employees in a hurry to catch the street car which went by right after quitting time. They could have gone around the ditch by using the regular sidewalk. However, on this afternoon several had jumped the ditch and gone on safely. But one employee either misjudged the distance or slipped because he fell in the ditch and sprained his ankle bad enough to be off from work for several days. Now basically do you believe that was due to the common excuses of carelessness, etc., or that we had set up a condition where it was too difficult or too inconvenient for the injured to have done the safe thing? Have you ever walked down the street and been blocked by a string of freight cars? Were you not tempted to climb over the couplings?

We had people working with certain chemicals, but we did not take the trouble to explain what would happen if it lodged under the finger nails, around cuticles and in knuckle folds and we had trouble. Whose indifference was that? There was the case of a man trying to look through a dilapidated glass shield. He couldn't see through it so he looked under it and got caustic in his eye.

But true indifference is another thing and can be overcome only by sincerity. How can you illustrate sincerity? During the war we worked 24 hours a day. The "B" and "C" shift foremen were indifferent to safety work. We asked for "B" and "C" shift safety committees but only got excuses. Well, in order to prove that we were sincere in our safety program, I held meetings in the early morning hours and late at night. The night foremen selected the most ungodly hours of the night for a meeting, but after I lost a lot of sleep to attend them, they relented and selected hours more suitable. Although I paid heavily in loss of sleep and rest

it paid dividends by instilling confidence in our safety program.

Consider the obstacle of the worker who has been tabbed a "radical," the non-conformist who thinks you are a "sissy" and that your safety ideas are a lot of "hooey." Here is a real live obstacle. He will tell you what is wrong. It is a good idea to listen. Occasionally you pick up good wheat from the chaff. Not only that but he sooner or later commits himself about something on which you can call his bluff by assigning him some activity. If handled properly he can be converted and a convert is the strongest believer. In all departments there is at least one "radical, instigator, rabble-rouser or trouble maker" and four out of five will respond to some subtle form of responsibility. We have handled these in various ways: (1) Put them on a safety committee; (2) Put them on an inspection tour; (3) Assign safety responsibility for certain items. And after a short while they will be ribbing you, "You are not much of a safety man—I found three other guards off after you left and also no cover on that 220 volt choke coil."

We have obstacles in employees not taking the necessary precautions for their health. Some plants refuse to recognize their Occupational Disease hazards for fear of stirring up trouble. This in my opinion is a poor policy. A clear understanding of the health hazards of a job will probably be all you will need to get compliance with safety measures.

Another obstacle frequently encountered is the inability of a nurse to compromise herself to the demands of industrial nursing. Some nurses with considerable hospital training have become inhibited with a certain set of stringent rules and regulations.

Goggle the Men

We had some employees who firmly stated that they would not wear safety goggles. We had all kinds of arguments. In some instances the goggles were faulty. Sometimes they were wrong in size. They frequently needed adjustment. We ordered specal bridge sizes for some and specal lens sizes for others. In several instances where we were in doubt we sent the goggles and the employee to an optometrist for proper fitting. We stuck with the problem until we had covered every angle and the employee was convinced that nothing was wrong with the goggles. Following through on a few cases is convincing to many.

During our safety work in one particular department, it became obvious that we should have a compulsory safety goggle rule because of chemical hazards. The previous accident record was bad.

We tried many different approaches in more than one department to get compulsory eye protection. The results were unsatisfactory. We were accused of trying to goggle-ize the whole plant. It appeared to many that we were more interested in getting people to wear goggles than we were in preventing eye injuries. So we took a different attitude. We adopted and worked on the the plan that goggles were an emergency device. We made a sincere effort to guard the operations. The result of this was that in many instances we found it no longer necessary for the men to wear goggles.

By all means, furnish and have accessible all devices for personal safety. Make compulsory only after a sincere effort has been made to guard the operation.

Guard the Machine

There are types of manufactured guards which serve to "goggle" the machines instead of the workers. Proper exhaust systems prevent many eye injuries. Homemade guards, like screens, barriers, dust-stops, etc., prevent eye injuries. We ought to meet with the obstacle of getting the right guard, that is, the one the operators will use and will not remove. We found that operators of machines have a dormant ingenuity. The operators often know the limitations as well as niceties of design of a guard. We know that most of our guards stay on the machines because the operators were consulted before the guards were selected.

We had an epidemic of accidents on our elevators. People would get their fingers caught between the heavy doors. The flange or fire steel makes a good guillotine. We tried a number of ideas and finally got a suggestion for a double swing door strap which would be left in or out of the shaft.

The fans we have had installed have guards with large open spaces. They were dangerous because accidents occured when several people caught their hands in them. We installed additional guards of one-half inch screen.

Everyone Can Help

Beneath all safety work there must be an undercurrent of interest which puts fire in it and makes people bring unsafe practices and unsafe conditions to the surface. In order to get the pot seething many avenues are open for enlisting the activity of others. How does your sales department function? How does your advertising department advertise? The mere asking for advice

from these sources may bring safety to their attention.

I owe a great deal to our advertising department. They are always willing to help with the design of posters, signs, plaques, etc. The work they do for me often comes to the attention of others. My mentioning the fact that "the advertising department is working on it" often puts the work in a better light and lends importance to it.

Most people are glad to give out advice and the mere stating of the problem often awakens interest and curiosity. Our chemists and engineers are no different and are often willing to give advice at "the drop of a hat." I have a working agreement with some other safety men and we swap advice whenever we can. We utilize any outside agencies that we can. The safety equipment companies do a lot for us, the manufacturers of equipment and materials we buy favors us with answers to some of our safety problems.

Training Is Important

A big obstacle to safety has been the lack of training of employees, all employees from the laborer to the executive. So many of our accident investigations contain the elements: (1) I didn't look; (2) I didn't think; and (3) I didn't know, so often I feel that the injured is a victim of inadequate or improper instruction. I get the feeling that he did not know just exactly what he was supposed to do or not to do. Too often we bring a man in off the street and after a few weeks or even

days put him to work on a machine that cost us anywhere from $500 to $50,000 and yet we would not let him drive our own car around the block.

We try to practice specific job instruction with the inclusion of safety as part of the job and not as something extra. We have held the well-known Foremanship Safety Training courses and have tried to follow this up with additional safety education movies or foremen safety conferences run by the foremen themselves. The reason why we all need more specific instructions is because our language lends itself to misunderstanding. Your definitions of words are not the same as mine and your ear and sight impressions are not the same as mine. Tell your people yourself about the hazards before they get misinformation from outside sources.

All Are Responsible

In conclusion, I say we are proud of our safety record. We don't say accident record any more because our record is more on the safe side than the accident. We have come a long way. We still have a long way to go. We have new problems every day. Five years ago we had a very simple program. Today we have a more complete program, but no more help to run it than before. We feel that others can make the progress that we have made, and perhaps quicker, because their operations may lend themselves better to safety work than ours do.

I pay tribute principally to our foremen who have come to realize that they are the safety directors in a department. I pay tribute to the management of the company which has had patience and did not expect a miracle over night, and I pay tribute to our employees. They have come to believe that *Safety Is Everybody's Business.*

Illustrations with this article are reproduced through the courtesy of the National Safety Council, Chicago.

Chemical Requirements of Pulping Processes

PULPING — *Rags*	Lime, lime and caustic soda, or caustic soda
PULPING — *Wood*: *Sulphite*	Sulphur, lime, caustic soda
PULPING — *Wood*: *Soda*	Caustic soda, soda ash
PULPING — *Wood*: *Sulphate*	Lime, soda ash, salt cake
PULPING — *Wood*: *Semichemical*	Sulphur, soda ash
WASHING AND SCREENING	Water—chemicals for purification
BLEACHING	Chlorine, lime, caustic soda, peroxides, zinc hydrosulphite
SIZING — *Engine*	Rosin, alum, waxes, sodium silicate, synthetic resins
SIZING — *Tub*	Glue, casein, starch formaldehyde
FILLERS	Clay, calcium carbonate, titanium dioxide, talc, barytes, gypsum
DYEING	Dyestuffs—organic and inorganic
COATING	Clay, blanc fixe, satin white, talc, titanium dioxide, etc.—casein, glue, starch, gums, waxes

Fig. 1—Basic chemicals used in pulp and paper manufacture

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▶▶▶ LONG AGO the pulp and paper industry accepted the belief that accurate statistics and fundamental economic data are a necessary basis for making forecasts, whether the plans based on the forecasts include expansion of capacity or an improvement of present production. During World War II, the War Production Board provided data on many industry activities that previously had not been recorded officially, and many mill executives found them highly valuable, began to depend upon them, and now want the continued recording of certain statistical series.

Most of the data collected during the war were for fibrous raw materials used by the pulp and paper mills—pulpwood, rags, wastepaper, etc. Very little information has been available on nonfibrous raw materials, except for estimated use-patterns for the scarcer chemicals drawn up by the Chemicals Division of the War Production Board.

Numerous requests have come to The Institute of Paper Chemistry with regard to the supply-demand situation of a particular pulp or papermaking chemical. Many are surprised that data on the industry's consumption of various chemicals are not readily available. Therefore, a discussion of the supply-demand picture pointing up the dark spots (the gaps), as well as the highlights (the availability of data), is in order.

Lack of knowledge concerning demand for chemicals used in pulp and paper manufacture is even more amazing when we realize that for a number of years pulp and paper manufacturers have been the second largest consumer of all industrial chemicals when the chemical industry itself is omitted.

Several government agencies collect supply data on industrial chemicals in which paper manufacturers are interested, but consumption data by industries are available for only a few pulp and paper chemicals. It would seem that, for security reasons alone, surveys should be made which would show not only the raw material resources and facilities for manufacturing important chemicals, but also the chief industrial consumers. Data should be available over a sufficiently long period so that secular trends could be determined and industry requirements accurately established. Yearly fluctuations and the recent expansion in capacity make it hazardous to take a single year as indicative of what the pulp and paper industry will need in the future.

The chemicals industry is vitally interested in the consumption pattern of its own products and the forces which are affecting and altering that pattern. Moreover, the chemical companies, in their desire to know their markets, potential and real, must estimate how much of the market they are currently holding. Therefore, they are the best sources for estimates of the total chemical market for particular chemicals and for particular industries. It is to such sources that we must turn for our information until more accurate data are collected by either government or private agencies.

Figure 1 illustrates graphically the chemicals used in the pulp and paper industry. It indicates that the main chemicals necessary for the pulping process are: lime, caustic soda, soda ash, chlorine, sulphate, salt cake, salt, and limestone. The resources of these minerals are fairly easily evaluated, even though the chemical requirements for pulp manufacture are not as readily established. The chemical which a particular pulp mill decides to use, of course, depends on the market situation for it in relation to the market for substitutes which might be used. All mills, and a particular mill over a number of years, therefore, will not follow exactly the pattern of chemical use shown in the outline.

As an illustration, specialty papers utilize a variety of chemicals. Some of these are: *abrasive papers*—aluminum oxide, silicon carbide, garnet or flint, with glue; *adhesive papers*—glue, starch, casein, sodium silicate, or latex; *blue and brown print papers*—potassium ferricyanide, potassium dichromate, and iron salts; *cigarette paper*—calcium carbonate, some nitrate; *decorative papers*—lacquers and varnishes made from resins, solvents, and driers; *fireproof paper*—ammonium sulphate and diammonium phosphate; *gypsum liner*—gypsum; leatherboard—latex; *photographic papers*—barium sulphate; *vegetable parchment*—sulphuric acid; *waterproof papers*—asphalt; *waxed papers*—wax; *wet strength papers*—wet strength resins.

Sulphur

Sulphur is the principal non-fibrous raw material used in the sulphite and semichemical pulping processes; from 200-300 pounds are required per ton of sulphite pulp and about 75 pounds per ton of semichemical pulp. The industry also uses small amounts of sulphuric acid directly in cleaning in the mill and considerable amounts indirectly in the chemicals made from sulphuric acid.

As a consumer of mined sulphur, the pulp and paper industry ranks third in the list of industrial users (*1*). The chemicals industry ranks first; three fourths of all sulphur mined is transformed into sulphuric acid, which, in turn, is used for the manufacture of a number of products of interest to the pulp and paper industry. The fertilizer industry ranks second.

TABLE 1—Estimated Chlorine Consumption by the Pulp and Paper Industry (1000 short tons)

Year	Amount Consumed	Per cent of Total
1929	70	35
1935	146	46
1937	157	35
1939	160	31
1940	170	27
1941	150	19
1942	163	16
1943	160	13
1944	160	13
1945	175*	15
1946	190*	16
1947	220*	16

1948-1950 possibility—275*

(Source: Estimates are for the most part taken from Chemical Engineering.)

(*) Estimates since 1945 are figured on the basis of usage of chlorine as follows: 5% sulphite (bleached) pulp, 10% sulphate pulp; 5% semibleached sulphate pulp, 3% soda, and a nominal amount for water purification and treatment. The 1948-1950 estimate is based on a maximum bleaching capacity for 1948 which should be in production by 1950 unless an economic depression comes at that time. Lamie (7) estimates that pulp bleaching took 21% of the supply in 1940 and 11% at the end of 1947. Talbot (8) estimates 28.9% in 1940 and 11.8% in 1944.

In 1933, the pulp and paper industry took approximately 17 per cent of the total supply of mined sulphur. But in 1945, when the total amount consumed nearly tripled the 1933 figure, the paper industry's use decreased to about 10 per cent of the total. Figure 2 shows the consumption of sulphur in sulphite pulping.

Dewhurst and Associates (*3*) state that the U.S. produced 83 per cent of the world supply of sulphur in 1937 and consumed 54 per cent of the world consumption. That our present resources will not be with us always is evident by their warning that the brimstone in the salt domes of the Gulf Coast states at the present rate of consumpion "will last only about 15 years." Then, they say, we will "have to turn to the pyrite deposits of the Southeastern and Western states, to the by-product sources at copper and zinc plants, and of natural and manufactured gas." We could also turn to the recovery of sulphur dioxide from the stack gases of large steam power plants.

The Bureau of Mines is of the opinion that we can also rely on gypsum as a source of sulphur. Pyrites are used for some purposes—e.g., sulphuric acid—when they are free from copper, lead, and zinc and are no more expensive in terms of price of recoverable sulphur at the mill, but the United States pulp mills at the present time do not use them.

Pyrites are used extensively for sulphite acid manufacture in Canada and Europe. The constant competition between alternate raw materials may allow pyrites to gain the ascendancy when the cost of mining sulphur reaches the point where price and quality are in their favor. This may come within the next 15 years or, if new deposits are found, some time after that.

Sulphur has shown a remarkable stability in price for the last 20 years which would not reflect any present serious threat of a depletion of resources. Supply has been ample for some time now and present inventories reflect no cause for alarm. However, the eventual decline of the native sulphur supply must be taken into account in any future planning.

Because of the importance which sulphur plays in the paper industry, the total supply and demand situation needs to be constantly surveyed, not only in terms of current market quotations but in terms of the possible increase in demand from new industries, from those which have already found it indispensable, and in terms of the possible depletion of resources from known deposits.

Salt

Salt (sodium chloride), which occurs abundantly in nature in all parts of the world and in most regions of the United States, is the direct source of the several sodium compounds used by the pulp manufacturers—compounds such as soda ash, caustic soda (sodium hydroxide), and sodium sulphate, and also chlorine. These compounds are sometimes mined as they occur in nature—e.g. soda ash and salt cake—and they are sometimes produced without salt, although, in most of the manufactured products, either salt is used directly or a product from salt is used as a raw material.

Salt in its native form is not used to any great extent by the paper industry, unless a company makes its own caustic or chlorine.

Caustic Soda

Electrolytically produced caustic soda (sodium hydroxide) is one of the most important forms in which the paper industry uses salt. Inasmuch as caustic soda is produced along with chlorine, which has become the more important product economically, it was produced in supplies greater than the demand during most of the prewar years.

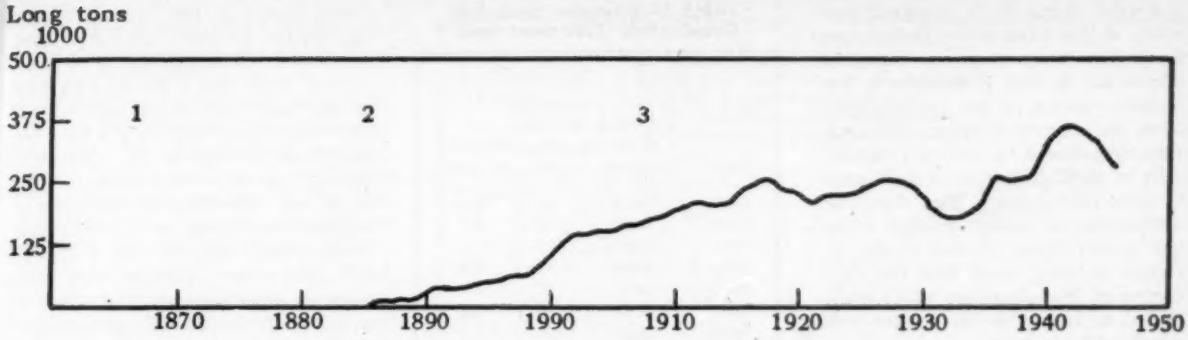

Fig. 2—Sulphur consumed by sulphite pulp industry. All forms (sulphur, pyrites, smelter gas) in equivalent tons; 3-year averages, centered. (1) Sulphite pulp process discovered (1866); (2) Sulphite pulp produced (1885); (3) Sulphate pulp produced (1907). Source: Data from 1940 on, from Bureau of Mines as reported in (2)

For 20 years, the low price varied little. As the supply increased, the paper industry has increased its use of it so that it has taken approximately 6 per cent of the total supply every year on the average since 1927, even though its consumption has more than tripled since then (*4*). From 33,000 tons in 1927, usage by the pulp and paper industry has grown to 130,000 tons in 1947 (*3*). The current tight supply situation is slowly being relieved by additional plant capacity. No official census data exists as to the distribution of the supply of caustic soda, but the use pattern has been estimated for many years (*4*).

There is need for an accurate census, at least occasionally, on the distribution of the caustic soda supply among industries in order to check the accuracy of the estimates.

Chlorine

Chlorine is another product used in great quantities by the paper industry and obtained from the natural resource, salt. Its importance in the national economy is evidenced by the fact that it was the first chemical to be placed under government allocation after World War II was declared. Other than for war purposes, industrial chemicals, and pulp and paper manufacture, it is used in lesser proportions by the textile and rayon industries, in sanitation, and in water treatment.

The War Production Board estimated that the chemical industry's consumption of chlorine rose from less than one-half of the supply before the war to three-fourths during the last of the war and that the paper industry consumption dropped from 33 per cent to 12-13 per cent during the same period (*5*). Before World War I, a considerable amount of chlorine was imported in the form of bleaching powder. A little more was exported during the war years than was imported but, in 1945 and 1946, the imports again were greater. This amount was not enough, however, to affect the price to any extent.

In the pulp and paper industry, chlorine is used chiefly for bleaching the various types of chemical pulps, rags, and wastepaper. It is used in minor quantities for bacterial control to prevent slime growth. There are several other bleaching agents used in the pulp industry including sodium chlorite, sodium hydrosulphite, sodium peroxide, and calcium hypochlorite (bleaching powder).

A few pulp companies (approximately 13 companies and 18 mills) make their own caustic soda and chlorine electrolytically. Not very many companies, particularly small ones, find this feasible, since the installation of a chlorine plant requires a capital outlay that could be justified only if a company used a large amount of chlorine and caustic or could sell the surplus at a profitable price. When competition is keen, these plants find it hard to sell profitably.

A company that contemplates setting up its own electrolytic plant must consider the cost of the plant in relation to the cost of the product delivered at the time and its probable cost for some time in the future, the convenience of buying the product, the availability of labor, and the ease with which equipment and finances may be obtained.

It would seem that, when the bleaching of kraft pulp becomes more general, mills which bleach 150 tons of pulp or more per day could produce chlorine and sodium hydroxide with economic advantages. This would be particularly true during times when the normal supply is curtailed. Installations by paper companies in the past largely have been the result of the cutting off of their normal supply. [Wells (*6*) has proposed a process by which chlorine sodium hydroxide, calcium hypochlorite, and sodium sulphide could be prepared from salt, lime, and sulphur.]

The U.S. Department of Commerce publishes the census production data on chlorine monthly, but no agency reports data on the consumption by industries. If the various estimates are correct, the paper industry took nearly half of the total supply at one time. It uses an estimated 16 per cent of the total at the present time. During the recent war, the War Production Board enacted Rule L11 which restricted the brightness of paper and thereby limited the industry's use of chlorine. The war uses took so much of the chlorine supply that the paper industry was able to consume only an estimated 13 per cent of the total. Since the end of the war, both the total supply and the pulp industry's use of chlorine have increased, although just how much of the supply the pulp industry is consuming currently is not known accurately. Estimates have been made from time to time by various people close to the supply (Table 1).

In August, 1945, chlorine was taken off of allocation. Since that time, the paper industry has been free to increase its consumption. Early in 1946, because of the lessened war demand, chlorine seemed relatively plentiful, but this situation did not last long. The Interstate Commerce Commission, which regulates the shipping of chlorine, had ruled that chlorine must be shipped in metal cylinders or in tank cars. Inasmuch as these were extremely scarce, the supply situation of chlorine was aggravated.

The shortage of chlorine, which started early in 1946, was reflected in the price. Chlorine has been approximately $1.75 per 100 pounds in tank car lots (freight charges equalized) with some few fluctuations since 1931. It began to rise early in 1946 and, by the summer of 1948, it has reached the level of $2.70-$3.90 (F.O.B. works). With the increased capacity which is estimated to be in production the last of 1948 and early 1949, the price should begin to decline.

It is highly important that specific

industrial demands be reported currently so that those using chlorine may know how much they can expect to obtain and at what probable cost. For security reasons, if not for economic ones, the accurate industrial consumption data should be collected periodically by the U.S. Bureau of the Census or some other agency. Data should be comparable for enough years to establish secular trends. A start in this direction is being made with the 1947 Census of Manufacturers which is expected to have chlorine consumption tabulated by industry.

Soda Ash

Another salt product used by the pulp and paper industry is soda ash (sodium carbonate). In the recent past, it has been the cheapest form of alkali used by the paper industry. Soda ash is the essential make-up chemical for pulping by the soda, sulphate, and semichemical processes and is used in cooking rags and straw. It is used in the preparation of rosin size, as a water softener, in the deinking of wastepapers, and for solubilizing casein.

Soda ash occurs naturally in California (Owens and Searles Lake), but the natural supply ordinarily comprises approximately 5 per cent of the total used (*9*), although in September, 1947, the proportion of natural product rose to 7 per cent. Most of the supply is manufactured from common salt by the ammonia process (Solvay soda process). For this reason, the price of ammonia and its scarcity influences the price of soda ash. If ammonia is scarce and the price high, it follows that the cost of making soda ash will also be high. During the war, expansion of soda ash capacity was curtailed and the product was allocated. However, in 1946 and 1947, capacity increased and, by the end of 1948, it is expected to reach 5 million tons a year (*10*). Both the manufactured production and mined product is expected to increase by 1949. Westvaco Chlorine Products Corporation has opened a mine in Wyoming which is expected to be in full operation by the end of 1948 (*9*).

Soda ash is used also in the glass (its largest use), soap, nonferrous metals, and chemical industries. When soda ash is less expensive than caustic, the latter can be made from soda ash and lime, although the amount of caustic from this source is declining except in the recovery operations from soda, sulphate, and semichemical pulp manufacture. Soda ash production is reported monthly by the U.S. Department of Commerce (Industry Report on Chemicals and Drugs). From a production level of 2.9 million short tons in 1939, soda ash has jumped to 4.2 million tons in 1946. The distribution of soda ash has been estimated (*4*), since there are no official census data on the distribution. The data for the past 20 years have been organized in Table 2 by The Institute of Paper Chemistry.

TABLE 2—Estimated Soda Ash Consumption (1000 short tons)

Year	Est. Total Consumption	Est. Consumption by Pulp and Paper Industry	Per Cent of Total
1927	1415	85	6.0
1929	1668	110	6.5
1931	1502	78	5.2
1933	1654	80	4.8
1935	1871	80	4.3
1937	2258	104	4.6
1939	2961	105	3.5
1941	3746	155	4.2
1943	4543	155	3.4
1945	4581	175	3.8
1946	4490	190	4.2
1947	4800	220	4.6

Salt Cake

Salt cake, as used by the pulp and paper industry, may also be termed a salt product. The first salt cake was made by Glauber by decomposing common salt with sulphuric acid (*11*). Although natural salt cake is frequently used by the pulp industry, the product most in use results as a by-product from the production of hydrochloric or muriatic acid. Niter cake, which is produced in minor amounts by plants making nitric acid from sodium nitrate and sulphuric acid, can also be used.

There are many sources of salt cake: the natural product, the by-product salts from hydrochloric acid; synthetic salt cake (*12*); chrome salt cake, and other by-product salts from the chemical industry. Glauber's salt differs from anhydrous sodium sulphate by 10 molecules of water and is not used by most of the pulp mills when salt cake is available because they do not have the equipment to handle the difficulties arising from the extra amount of water in the salt. However, the producers of sulphate wood pulp are extremely dependent upon salt cake and, if enough salt cake is not available, they must draw on the supply of other types of sodium sulphate for their efficient operations.

TABLE 3

Year	Total Sodium Sulphate Supply	Supply of Salt Cake (Domestic plus imports)	Est. Amount used by Pulp Industry	Per cent of Total
1941	827	607	604	73
1942	936	665	650	70
1943	880	598	583	66
1944	890	596	625	70
1945	842	563	615	73
1946	825	552	630	76
1947	960	671	650	65

(Source: See reference 14 for supply data. Other figures were prepared therefrom by The Institute of Paper Chemistry.)

The various sources of salt cake were adequate to meet the increased use of the growing kraft industry during the late thirties, although the industry took larger proportions of the supply each year. Both anhydrous sodium sulphate and Glauber's salt are ordinarily used in the production of materials other than paper but, in the last few years, the supply of salt cake has not been sufficient to meet the needs of the kraft industry and it has had to make its own substitutes, using synthetic materials or Glauber's salt. The glass industry, a large user of salt cake, has in recent years turned to salt more than to salt cake in crude form.

The amount of salt cake or its equivalent in some form of sodium sulphate used by the kraft pulp industry may vary, from below 100 to around 450 pounds per ton of pulp. The wide range is accounted for by the improvements which have been made in the recovery processes. With increased installations of precipitators in the newer pulp mills (*13*), usage of salt cake for kraft pulp has decreased. Before the war, the average was considered to be about 360 pounds but today it is closer to 250-275 pounds, and a number of mills have lowered this figure. Although there are other users of salt cake in the pulp and paper industry, the production of kraft pulp has provided the industry with the base for its estimates of salt cake. The estimated consumption of salt cake as related to the capacity and production of sulphate pulp is presented in Figure 3.

Exactly what proportion of the total supply the industry takes, of course, depends upon the definition of supply. The Minerals Yearbook each year carries data on the amount of crude salt cake which is mined. The U.S. Department of Commerce (Industry Report on Chemicals and Drugs) indicates the amount of inorganic chemicals produced either as by-products or synthetically. To obtain a complete picture of supply (at least during a short supply period), we must include the mined and produced salt cake data, imports, the data on Glauber's salt, and anhydrous sodium sulphate even though

they are not substitutes in the pulp and paper industry unless the supply of salt cake is especially scarce.

Before the war the sulphate pulp industry depended greatly upon imports to make up the needed supply of salt cake. Total imports in 1937 (largely German) amounted to 237,000 tons, equivalent to about one-third of the United States salt cake supply (*14*).

By 1940, only 73,000 tons of salt cake came into this country. Over half came from the United Kingdom and Canada. Belgium provided the largest amount from any European country. Germany's contribution had declined to a mere 2200 tons that year.

The government-owned Saskatchewan Minerals Plant at Lake Chaplin commenced production of salt cake and Glauber's salt in 1947 which aided the kraft pulp mills in a minor way. Canada imported from us almost as much salt cake and Glauber's salt as she sent to us. In 1945, for example, she sent 17,564 tons of sodium sulphate to us and imported 14,551 tons of salt cake and Glauber's salt (*14*). The West Coast pulp mills have never depended upon imports. They obtain their salt cake from the natural deposits at Searles Lake.

The shortage of salt cake is not of recent origin. It began in 1940 with the decline in European imports. To make up for this loss, several chemical companies began to produce it from various brines. Both the Arizona Chemical Company and the Desert Chemical Company extracted it from salt brines for the first time (*15*). One chemical company made it synthetically (*12*) and, although the process was patented, it could be duplicated well enough by the kraft pulp mills by mixing three parts of sulphur with ten parts of soda ash. Other mills made a substitute product out of gypsum and soda ash which served as a temporary expedient in kraft pulping, but soda ash also was scarce. Various other ideas of producing salt cake were tried, but none of them was perfected enough to be put into production and thus relieve the shortage to any appreciable extent (*16*).

The production of salt cake (mined or produced), of Glauber's salt, and of anhydrous sodium sulphate and the percentage of that supply (domestic production, plus imports) used by the sulphate pulp industry are listed in Table 3.

The data on Table 3 show that the supply of salt cake alone has not been sufficient in recent years to fill the needs of the sulphate mills, let alone the other demands. The lack of supply has been compensated by the use of substitutes for salt cake or by the use of Glauber's salts of anhydrous sodium sulphate.

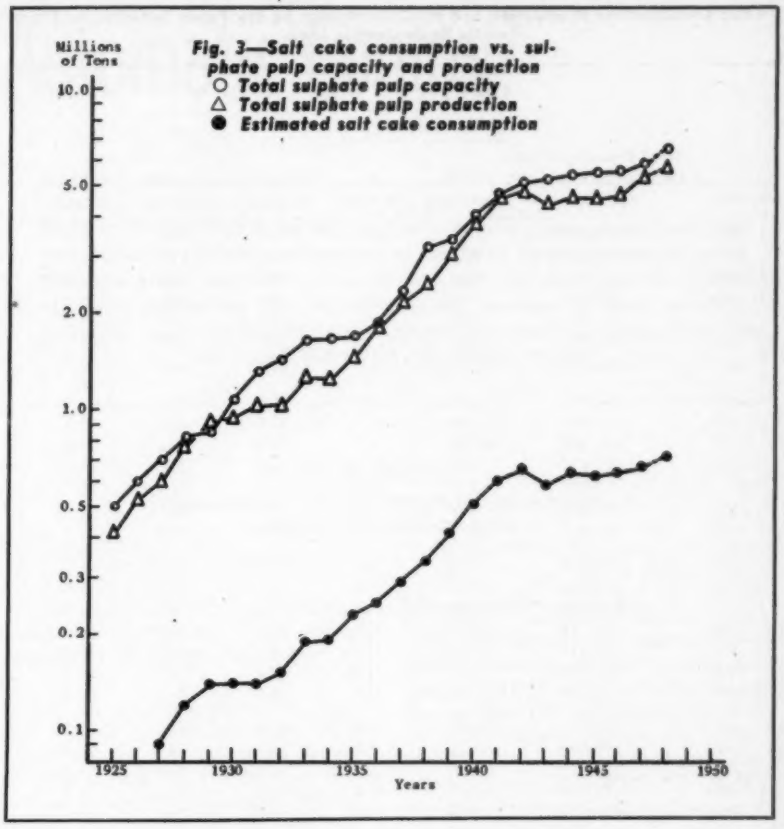

Fig. 3—Salt cake consumption vs. sulphate pulp capacity and production
○ **Total sulphate pulp capacity**
△ **Total sulphate pulp production**
● **Estimated salt cake consumption**

Price indicates the supply situation. The scarce supply situation which developed during the war years forced the price up to between $25 and $28 a ton. The prewar price ranged from $13 to $15 a ton, a price set by imports of a by-product which had little value and which was delivered to the pulp mills at a very low ocean freight rate. The present price has prompted the government-owned plant in Saskatchewan to ship sodium sulphate to this country under terms which may help develop that deposit.

The Canadian Government is asking for a five-year contract at a price which is so much lower, even when including a high freight rate to the southern kraft mills, that it can compete favorably where the shortages are the greatest. The shortage of freight cars and the possible uncertainties of shipping, however, make the Canadian product still undesirable in comparison with the domestic by-product when it is available.

As long as the costs of producing muriatic acid continue upward, the natural products will undoubtedly be able to compete, despite the high costs of transportation. This would also hold true for the product from North Dakota, when and if that development takes place. These deposits are controlled by the Ozark Chemical Company (*17*). If they can be put into operation while the price of the by-product remains high and can meet Canadian competition in transportation rates, it will undoubtedly be very worthwhile to develop them. Whether the natural product in North Dakota (*16*) or in Canada—both a considerable distance from the largest use market in the sulphate industry—can continue to compete in normal times with the by-product, of course, would seem to be doubtful. The advantage which the natural salt cake has today would seem to be temporary because of the high transportation costs.

Companies producing salt cake are located in the south central or western part of the United States. In 1933, the American Potash & Chemical Corporation began to mine salt cake at Trona in the Searles Lake Region. In the latter part of the thirties, several companies began to mine it—the Ozark Chemical Company at Monahaus, Texas; the Sodium Products Company at Wilson Creek, Grant County, Washington; the Salt Lake Sodium Production Company at Saltair mined Glauber's salt and anhydrous sodium sulphate; some Glauber's salt was produced near Casper, Wyoming and the Iowa Soda Products Company mined

TABLE 4—Limestone Production and its Consumption by the Paper Industry as Stone or its Equivalent in Lime

Year	Total Production Sold Or Used by Producers (All uses)	Consumed as Stone and Lime (Includes Bleach)* (1000 short tons)	Per Cent	Consumed as Stone	Consumed As Lime	Total Lime Per cent
1921	75,800 (est.)	592	0.8	120	236	9.0
1922	96,427	770	0.7	149	310	8.5
1923	119,775	829	0.7	207	311	7.7
1924	122,001	738	0.6	138	300	7.3
1925	135,761	863	0.6	110	377	8.2
1926	142,983	1049	0.7	202	423	9.3
1927	152,687	1148	0.7	289	430	9.7
1928	150,797	1013	0.7	155	430	9.6
1929	152,839	1095	0.7	274	411	9.6
1930	136,362	1006	0.7	249	379	9.6
1931	103,907	768	0.7	194	287	10.6
1932	70,314	672	0.9	153	260	13.2
1933	66,489	806	1.2	196	305	13.4
1934	82,032	850	1.0	262	294	12.3
1935	83,411	877	1.0	188	344.5	11.5
1936	123,886	1050	0.8	230	397	10.6
1937	132,374	1218	0.9	323	448	10.9
1938	114,391	1027	0.9	223	402	12.0
1939	139,818	1231	0.9	303	464	10.9
1940	156,473	1467	0.9	334	567	11.6
1941	188,058	1716	0.9	362	677	11.1
1942	202,353	1648	0.8	435	606	11.1
1943	178,040	1472	0.8	385	543	8.2
1944	152,601	1440	0.9	375	532	8.2
1945	151,747	1375	0.9	353	511	8.6
1946	190,579	1518	0.87	386	566	9.4
1947	213,497	1861	0.85	570	646	9.5

(*) Limestone equivalent of lime is calculated by multiplying the quantity of lime by 2.

Source: Mineral Resources, 1921-1932; Minerals Yearbooks from 1932 on. See reference 18 for all data on limestone and its equivalent in lime.

Glauber's salt at Rawlins, Wyoming (*15*). However, the natural product is a considerable distance away from the South, which uses the most salt cake. If transportation costs continue to rise, the ample supply of the natural product in the West will not satisfactorily meet the demand in the South.

There is probably no field of statistical inquiry more important for the pulp and paper industry than that of salt cake, yet accurate data, which would indicate trends, are not available for the paper industry's consumption over the years. The paper industry still plans for future expansion on the assumption that salt cake will be available at reasonable costs without knowing definitely whether or not this will be so.

Limestone

Limestone, either in the mined form or as lime, is the oldest chemical raw material used by the paper industry. Much of that consumed by industry today is used as a cooking liquor in the sulphite process, where a high calcium lime containing very little magnesia is used. The cooking liquor is produced by the chemical reaction between sulphur dioxide and lime (*18*). A high magnesium or dolomitic lime is preferred in the milk-of-lime method of sulphite pulping. Most sulphite mills, however, use the Jenssen tower system whereby limestone is used rather than limes.

Sulphate and soda pulping processes also use large quantities of lime in the manufacture of cooking liquors. Lime is used to convert soda ash to caustic soda. While the bulk of the lime used is recovered and reused, the quantity of make-up amounts to a very substantial tonnage.

A quicklime is used in cooking rags and straw, dolomitic lime being preferred for the latter. Lime is used for making calcium hypochlorite used in bleaching. Some hydrated lime is used for softening and purifying water, and as an emergency supply in storage, inasmuch as quicklime does not store well. It air slakes and eventually becomes useless for many purposes. Its transportation, therefore, is a packaging problem. It must be packaged in airproof and moistureproof bags or steel drums; the former are gaining in usage. Lime is also used in the utilization of sulphite waste liquor.

Of all the industrial users of limestone, either as the stone or as lime, the paper industry ranks fourth, according to the Bureau of Mines (*18*). Even that amount is small and represented only 2.8 per cent of the total industrial uses in 1945, or 1,375,000 tons out of a total of 49 million. Moreover, the chemical and processing industries consume only about a third of the total supply of limestone. The biggest users are, of course, the nonindustrial ones, such as concrete and other road material, cement manufacture, railroad ballast, liming the land, harbor work, building stone, etc. The consumption by the paper industry of limestone and its equivalent of lime (at a two to one ratio) is indicated in Table 4.

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Why Automatic Control?

EDITOR'S NOTE: This is the first part of a lecture course prepared by Mr. Akins for use in teaching fundamentals of automatic control to new personnel. While the article does not deal specifically with the paper industry, it does touch on engineering and control problems common to many industrial processes. Subsequent parts of the lecture will appear in future issues of THE PAPER INDUSTRY AND PAPER WORLD.

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▶▶▶ USEFULNESS in terms of dollars and cents is the fundamental reason for automatic control. Maximum economy is obtained by engineering the control system into the process rather than by adding gadgets to equipment as an after thought.

For the purpose of illustration a process is studied that represents many problems often encountered. While this process is hypothetical, the difficulties and subsequent remedies found in this problem are common to many control installations.

To add a touch of realism, the story will be related by an inexperienced user of instruments. His reactions to the successive complications encountered can be considered as typical to those of the uninformed engineer or superintendent who has undertaken a program of instrumentation.

Batch Process Outmoded

For twenty years I have owned and operated a small company engaged in the manufacture of a high grade chemical compound. Over the past decade our production methods followed the typical batch process plan. The procedure was: first, mix together several dry ingredients, add a given quantity of water, heat the mass, and stir until the mixture reached the proper consistency. The mixture was then placed in large pans and taken into spacious drying rooms for curing. A series of steam coils arranged around the drying rooms maintained a fairly constant temperature of 100 Fahr. Twenty-four hours later the compound was properly dried or cured and could be placed in small cans for shipment. The selling price for each can was one dollar.

Due to a gradual increase in sales, we were finally faced with the problem of tripling our output if we wished to retain our old customers. A rough survey showed us that the bottleneck in our production line was the drying room operation. To provide adequate drying room space we would be forced to buy adjoining property at an excessive high cost and since our company had a limited source of capital we could not afford such an expenditure.

Design Continuous Process

I then called in our mechanical engineer and explained to him that in order to increase our drying capacity, yet keep within the space limitations of our property, we must design a new machine to continuously dry our product—not in twenty-four hours, but in two hours. Our design began along somewhat conventional lines. (Figure 1).

First, we planned an upper floor level and a battery of kettles in which to perform the mixing operation. As each batch was completed, the wet mixture would be discharged into a constant rate feeding device. By this means we could obtain a constant flow of compound into the machine regardless of the number of kettles in operation.

The new drying machine was to consist of a long belt conveyor surrounded by a drying cabinet. The wet mixture would feed on the belt in a thin layer to permit rapid drying. Heated air for the drying cabinet would be provided by drawing in outdoor air, passing it through a pipe coil steam heater, thence into a plenum chamber running the full length of the drying cabinet. A series of nozzles in the bottom of the plenum would direct the heated air over the product.

As the product left the drying machine it would fall into a canning machine and there be automatically placed in cans, ready for market. Our new production schedule called for an output from the machine of ten cans per minute. In other words, the new production rate would be $10 per minute.

We then made a preliminary estimate of the cost of the machine. We found that the machine must be 300 feet long to accomplish the drying in two hours, and because special corrosion resistant materials were required throughout the machine, the cost of the machine would be $300,000. If we were to justify such expense, the machine must operate at top efficiency twenty-four hours a day.

Salvage Old Equipment

At this point we felt that numerous savings could be made by using salvaged materials in the construction of the machine. For instance, in selecting the heater for the outdoor air, we decided to use a two-inch pipe coil unit which was on hand. While this heater was fairly bulky, we managed to fit it into the allotted space.

The steam supply pipe to the heater was calculated to be a six-inch line if the friction drop was to be held to a minimum. Since we had a quantity of four-inch pipe on hand, we chose to take a greater pressure drop in the line to avoid buying new pipe.

Now came the matter of controlling the flow of steam to the heater by some form of throttling valve and temperature regulating device. Reviewing our experience with temperature control in the old drying rooms, we felt that the new machine could be easily controlled.

Back in the old days, the steam flow to the drying rooms was hand controlled. If the temperature rose one degree, the operator merely shut off the hand valve and the temperature would gradually drop. If more heat was required, the operator opened the valve and the temperature would slowly climb. To eliminate this hand operation, we installed a simple pneumatic type recording controller to open and close a diaphragm operated valve. This equipment maintained the drying temperature within plus or minus one degree of the desired 100 Fahr. and gave us trouble-free service for many years.

It so happened that we had a spare diaphragm valve from one of the old rooms, and while it appeared a little oversize, we decided to use it on the new machine to save the cost of a new valve. The valve, six-inch in size, was

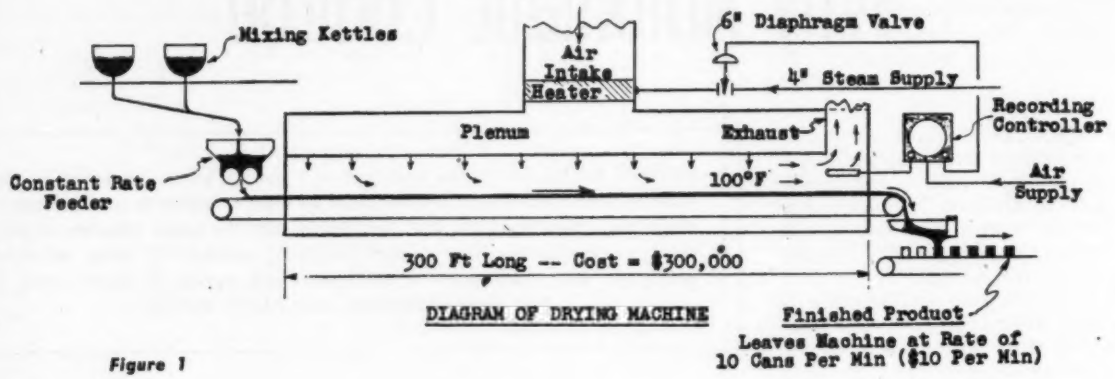


Figure 1

then installed in the four-inch steam line.

Then came the selection of the controller. If the little gadget, bearing the name AA Controller, had done such a fine job in the old rooms, why not buy one for the new machine? With this thought in mind I contacted the local salesman of the AA Controller Company and explained to him that we needed another controller for a new machine.

His first question was, "Can you tell me something about the operation of this machine?" My answer was, "No, definitely not. This is a secret process and I cannot afford to let competition learn of our production methods. Just place an order for the same type recording controller we are now using. Our experience shows that it should do a good job."

He seemed reluctant to accept the order without further knowledge of the machine, but upon my continued insistence, finally entered the order for one AA Controller.

Some months later our machine was completed. Then came the final planning for the operating procedure to be followed. From our years of experience in drying the compound, we knew that the final drying temperature must never exceed 102 Fahr. or the product would be too dry and cause a very objectionable dust. On the other hand, if the final temperature dropped below 98 Fahr., the compound would be too moist and likely to cake in the cans. Our very exacting customers would promptly return the product if either of these conditions existed. Our temperature control band was therefore plus or minus 2 Fahr.

Wrong Control System

The great day of start-up arrived. Turning on the motors, the steam, and starting the first batch of material into the new machine, we stationed ourselves at the recording controller to watch the temperature record. To our utter disappointment, the recording pen traced a continuous cycle, first ten degrees above the control point, then ten degrees below. (Figure 2-a)

We found that during one part of this cycle we were producing ten cans which were acceptable and in the following part of the cycle we were throwing away ten cans because they were either over dried or under dried. In other words, our machine was producing only 50 per cent of its total capacity because we were first producing ten cans then throwing ten away. After operating a few hours under these conditions we decided to shut down because it was too costly to operate on such a basis. I immediately phoned my friend, the AA Controller salesman, and told him of our difficulties. I explained that we were trying to maintain a final temperature at the leaving end of a drying cabinet and that heated air, regulated by a throttling steam valve, was directed over the product as it rode through the cabinet on a conveyor. The final drying condition depended, therefore, upon the temperature at the leaving end of the cabinet. My friend came back with the answer, "The old drying rooms were easy to control because the small amount of heat added to a large space caused the temperature to change only slightly. The on-off device known as our AA Controller was ideal for such application. In your new machine a small quantity of steam admitted to the heater will cause the temperature to rise rapidly." He went on to explain that our process required a proportional type controller and that he could furnish such a device in relatively short time. My reply was, "Ship it as fast as possible so we can get back into production."

A few weeks later we received the controller and immediately installed it. We were again ready to start the machine. Since this instrument was considerably different from the older type, I called my friend on the phone for instructions as to its operation. Here is what he told me: "Open the front of the case and inside you will find a knob. As you experience the cyclic condition, turn the knob to the right until the cycle disappears." Following his advice we turned the knob to the right and sure enough the cycle gradually diminished and the process became stable.

Load Changes Cause Trouble

Everything went along fine for about four hours. At that time we had a breakdown of the feeding mechanism at the feed-in of the drying machine. Investigating this trouble we found that the feeding mechanism was plugged by some of the compound lodged around the screw feed blades. We decided the best remedy would be to shut down the feeding mechanism every two hours, flush it down with a hose, and start up again. The flushing procedure required five minutes. On the first wash-down operation, we found to our amazement that as soon as the feeding mechanism was shut down and the rest of the drying machine was allowed to run, the temperature crept up far beyond our desired control point. When the feeding mechanism was again started, the temperature gradually dropped back to the control point. During the five-minute washing period we lost fifty cans. (Figure 2-b)

Analyzing this condition, we reasoned that the drying load was decreased during the time the feeding

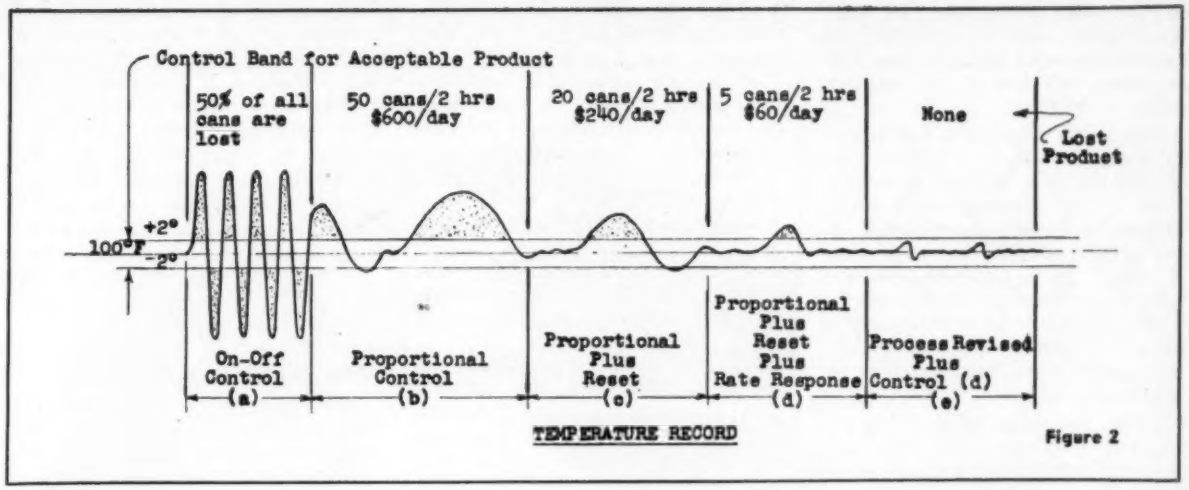


Figure 2

mechanism was being cleaned. It was necessary, therefore, that the steam valve should be throttled down to compensate for the decreased load. As the load crept back to normal after the wash-down, the valve should be repositioned to the original flow of steam. In other words, a change in load on this system caused a shift from the control point.

Again I telephoned my salesman friend and explained our latest trouble. His answer was this: "Yes, to handle the load change you will need an auxiliary device called automatic reset which can be installed in your present instrument." The term *automatic reset* meant little to me. My one desire was to operate the machine at maximum efficiency regardless of the terminology applied to controller parts. The bump in temperature just experienced cost us $50 during its duration, hence I felt that an auxiliary device was certainly justified. I, therefore, directed the salesman to rush this new gadget to us.

The new piece of equipment was promptly delivered and we proceeded to install it in our existing controller case. Now how do we operate this new device? Calling my friend on the telephone once more for instructions, he explained that by opening the case I would find a second knob. To get best results I should turn the first knob a little farther to the right and then adjust the second knob until the temperature bump was reduced.

Still More Losses

True enough, by adjusting both knobs we found that we could reduce the bump until the loss amounted to twenty cans for every wash-up period. Our loss was then $20 every two hours and regardless of the adjustments we made with the two knobs we could not reduce it further. (Figure 2-c)

Once again I called my friend and asked him if there was any way we could speed up the return to the control point. His answer was, "Yes, we can sell you a third and final device that will cause a rapid return. This device we call rate response or derivative action." Naturally I was confused by this terminology but if this device would increase the efficiency of my machine, he could sell me anything in the catalogue regardless of its name.

In the course of a week we installed the third gadget in our controller and I called my friend for further instructions.

First, he summarized the various control adjustments in the instrument. Knob No. 1 permitted adjustment of the throttling range or proportional band to produce stability; knob No. 2 provided for the adjustment of automatic reset rate; and the last addition, knob No. 3, allowed us to adjust the mount of rate response. He told me to turn knob No. 1 slightly to the left, turn the second knob a bit to the right, and finally adjust the third knob until we reduced the bump in temperature to a minimum. Following his instructions we made these adjustments and thereby reduced our loss to five cans every two hours. (Figure 2-d)

Perhaps I should have been satisfied with this loss but when I considered $5 every two hours based on a twenty-four hour production schedule amounted to $60 per day, I felt that we were still losing money unnecessarily. By this time I was a bit peeved at my salesman friend since he had sold me every possible extra and we were still losing product. Calling him on the phone once more I expressed my thoughts quite pointedly. His answer was this: "It appears that your machine is unusually difficult to control and I am unable to help you further. If you will allow one of our factory engineers to inspect your machine I feel that he may make recommendations that will be helpful. At least, it is worth a try." I thereupon agreed to let the engineer see our equipment and the necessary arrangements were made for his inspection trip.

Analyze the Process

A week or two later the factory engineer appeared and I proceeded to show him the machine. First of all, he inspected the air heater, made a few rough calculations and asked me about drying rates, amount of moisture removed, etc. Next, he examined the diaphragm valve and smiled broadly when he saw it was such an old type. He then inspected our steam supply line feeding the valve and again made a few calculations. Next, he inspected the thermal system of our instrument.

We then sat down to talk over the problem.

His explanation ran as follows: It is unfortunate that your air heater is of the pipe coil type and is 50 per cent oversize for this job. The amount of metal contained in the heater pipes is objectionable from the standpoint of good control. The excess metal acts as a storage space for heat, and will tend to cause overshooting when the control valve has cut off the supply of steam. This type heater offers a serious time lag in the transfer of heat from the steam to the surrounding air.

Because of the thermal lag of the heater, plus the time required for the heated air to reach the bulb of the instrument, it was necessary for you to use a proportional type controller. The throttling range, or sensitivity of the instrument, was altered until the system became stable in operation.

There are four things wrong with your control valve. First, it is oversized

and you will find that when the valve is but halfway open it is delivering all the steam needed for your job. You are using only half of the available stroke of the valve.

Second, the diaphragm top of this valve consists of a piece of sheet rubber and the force required to move it when at its extreme upward position, or extreme downward position is appreciably greater than that at the center of travel. Such condition produces uneven performance throughout the stroke. This could be improved by the use of a molded type diaphragm allowing greater flexibility throughout its movement.

Third, the design of the plug and seat are of the bevel disc type. You will find that its rate of flow versus travel characteristics varies greatly over the range from the nearly closed position to the nearly open. This variance of flow characteristic is detrimental to consistent and stable control. A valve of the "V" port design is required on this job.

Fourth, the frictional forces in this valve are excessive. The accumulation of the diaphragm hysteresis, spring hysteresis and friction at the stuffing box undoubtedly produce a 5 per cent dead spot in the action of your valve. That is, there is a band of 5 per cent or more in which the valve stays at rest until sufficient air pressure is added to break it away from that position. It may also overshoot in the other direction when it breaks free. By installing a valve positioner you can easily overcome these frictional forces.

Another serious defect in your system is that the steam supply line is too small. The frictional resistance of this pipe when working at full load does more to govern the flow of steam than does your valve. In other words, there is so much friction in the line that the valve can move appreciably and yet barely change the flow rate of steam.

The thermal system you are using is an extremely old type and it has poor response to temperature changes. It is known as a gas filled system and because of the need for a large volume of gas at high pressure the bulb was made very large and heavy. Consequently, it is slow to respond to temperature changes of the surrounding air. You need a capillary type bulb either liquid filled or vapor actuated to obtain rapid response to temperature changes.

Recommended Changes

He then summarized the changes we must make to obtain the quality of control demanded by our drying process. These were:

1) Install a new heater of proper size and of the finned tube type to provide rapid heat transfer

2) Replace the six-inch diaphragm valve with a four-inch "V" port valve of a modern design and equipped with a positioner

3) Replace the four-inch steam line with a six-inch line

4) Replace the old style thermal element with a capillary bulb

He went on to explain that as soon as these changes were made he would return to make the final adjustment of the instrument.

Hopeful that we could eliminate the loss of $5 each wash-up period, or a daily loss of $60, I decided to make the recommended changes. Some time later we shut down the machine for a week's time and installed the proper heater, steam line, etc. The cost of this work came to $6,000 plus the loss of one week's production.

Perfection at Last

When the work was completed, I called the engineer back to our plant and he proceeded to make the final instrument settings. With a few minor adjustments our system came into control and the temperature was held to within the desired control band regardless of the load change imposed during our wash-down period. (Figure 2-e)

In other words, we could now produce continuously for 24 hours a day without losing a single can. The justification for having a good controller as well as a properly designed system was clearly borne out by the results of this investigation.

Considering that I had a machine costing $300,000 plus another $6,000 for changes I was surprised when I found that the cost of the automatic controller and its related piping was only $2,000. This $2,000 was a very small portion of the total expenditure of $306,000, yet it was a most vital item in making the machine function at top efficiency. It does seem that the economics of automatic control are quite apparent from this summation.

Thus the typical account of a user of instruments is concluded. His summation regarding the proper control application and the overall cost of the installation has undoubtedly been duplicated in scores of reports describing the conversion from the batch process to a continuous process.

Other Load Changes

The disturbance caused during the wash-up period in the problem was only one of several possible load changes. For instance, the outdoor air fed to the steam coil could change in temperature from time to time. In the daytime it may be entering at 65 Fahr. but during the night may drop to 45 Fahr. The controller must catch this change and correct the flow through the steam valve to compensate for the load change.

It could be possible that during the night shift, the operator in charge of the mixing kettles added more water by mistake to one mix and let it flow down to the drying machine. Since the mixture contained more water than normal, more steam would be required to dry the compound. Again, the little black box must cause the steam valve to open further to correct for this load change.

Should the constant feeding device develop excessive friction from time to time, it would cause a change in flow rate to the machine thus constituting a load change. In a similar manner the speed of the conveyor belt through the drying compartment may vary and another load change would be imposed on the control system.

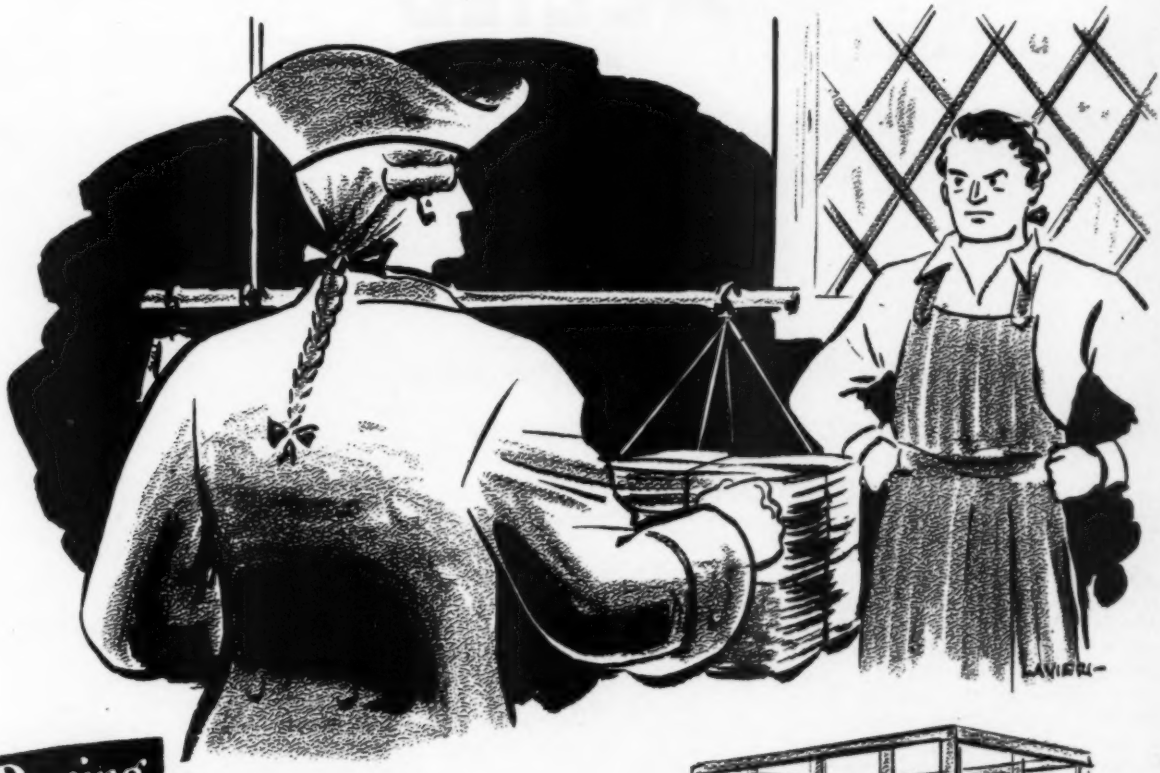
It is possible, too, that the pressure of the steam supplied to the control valve could change. During the day all departments are operating and the steam pressure would be three pounds. At night many of the departments shut down and the steam pressure would then rise to five pounds. The flow through the valve would be increased above normal, and another load change requiring compensation would be added to the duties of the instrument.

Adding the load changes, beginning with the first and major change, the wash-down period, we can count six variables or load changes that must be handled by the controller. Should any of these variables become great it would be advisable to install additional controllers such as a pressure regulator for the steam line, a preheating control for the incoming air, etc.

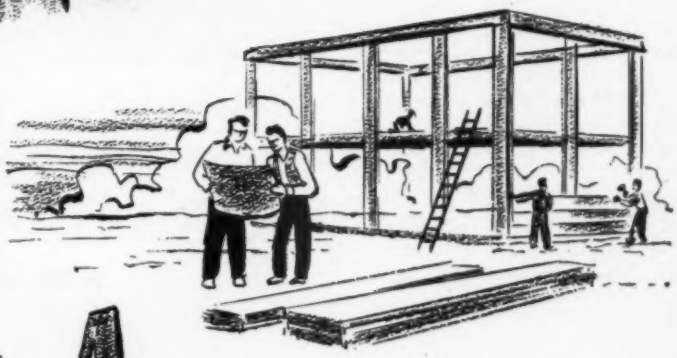
Erratum

Our attention has been drawn to an erroneous impression given on page 876 of our September, 1948, issue. The Cottrell precipitator in the new kraft mill at the Weyerhaeuser Timber Company Pulp Division at Longview, Washington, was designed, engineered, manufactured and installed by the Western Precipitation Corporation, Los Angeles, California, and not by any other company.

PAPER SKETCHES



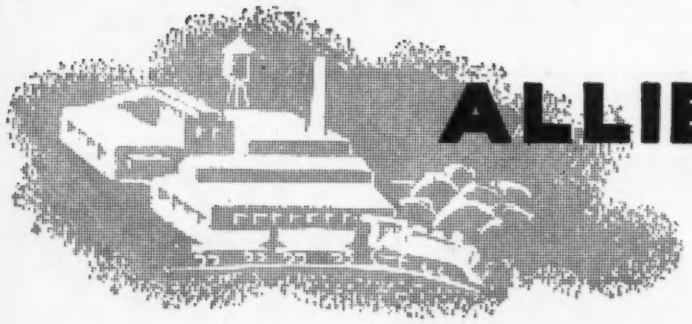
During THE LATTER PART OF THE REIGN OF GEORGE III (1803) EVERY ENGLISH PAPERMAKER WAS OBLIGED TO PROVIDE SCALES ON WHICH EXCISE OFFICERS WEIGHED THE MILLS' OUTPUT TO DETERMINE THE AMOUNT OF DUTY DUE.



A LARGE PAPER MILL WAS BUILT IN FRANCE IN 1840 ON THE SPOT WHERE N. LOUIS ROBERT INVENTED THE FOURDRINIER PAPERMAKING MACHINE. THIS WAS AT ESSONNE — ABOUT AN HOUR'S JOURNEY FROM PARIS.

THE FIRST KNOWN PAPERMAKER, TS'AI LUN, WAS DIRECTOR OF THE IMPERIAL CHINESE ARSENALS ABOUT 89 A.D. HE SUPERVISED THE MAKING OF SWORDS AND OTHER WEAPONS.

THE MANUSCRIPTS, DRAWINGS, CORRESPONDENCE, ETC., USED TO DATE IN THE PREPARATION OF THE FOURTH EDITION OF "THE MANUFACTURE OF PULP AND PAPER" WEIGH 143 POUNDS AND MAKE A STACK 5 FEET 9 INCHES HIGH.



Pusey and Jones Corporation Rounds Out One Century—Begins Another

▸▸▸ FOUNDED as a machine shop in 1848, The Pusey and Jones Corporation, Wilmington, Delaware, has been a pioneer builder of both ships and papermaking machinery. It was in 1867, however, that the first complete paper machines were built by this company. In that year, two 86-in. fourdrinier machines were built for Rockland Paper Mills (later to become Jessup and Moore Paper Company).

By 1887, machines were under construction having widths of 90, 92 and 96, and 112 inches. The 112-in. machine was built for the Hudson River Pulp and Paper Company and is said to have been the largest machine in existence at that time. Since then, The Pusey and Jones Corporation has kept up with progress; the company has built high speed paper and board machines for practically all grades of paper in widths to 245 inches. Over the years its paper machines have been exported to fifteen or more foreign countries.

Ship building, too, has been a major field in which Pusey and Jones has been active. In 1854, the first iron sailing vessel in the United States was built by this company. From the stern-wheeled vessels of the Civil War to cargo vessels for World War II, its shipbuilding has been of major importance. Pusey and Jones built the racing yacht "Volunteer," winner of the International Cup Race in 1887.

The history of The Pusey and Jones Corporation is thus related in a special anniversary book entitled *A Hundred Years A-Building*. From the early struggles of Joshua L. Pusey and John Jones down to the present time, this book highlights many interesting events and achievements.

▼

▸▸▸ IN A MANNER readily understood by the general public, "Mighty Labors," a 16mm sound and color motion picture, just released by Industrial Engineering College, Chicago, Illinois, answers the question, "What Is Industrial Engineering?" The film clearly illustrates and explains modern controls essential to economical production. Assistance in producing the film was provided by twenty-four major business and industrial firms in the Chicago and Detroit areas.

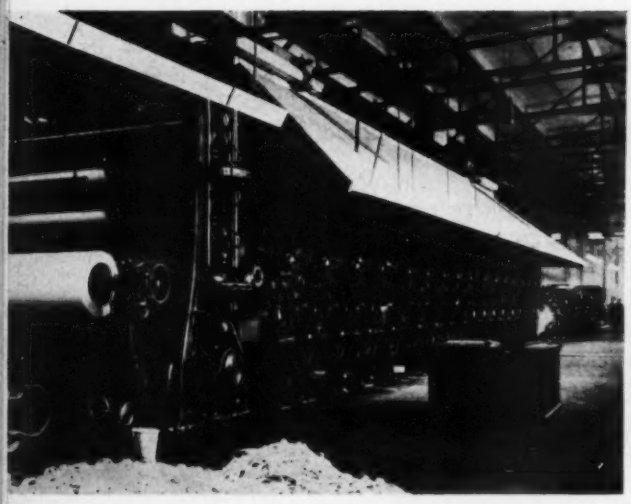
▼

BAKELITE CORP. EXPANDS

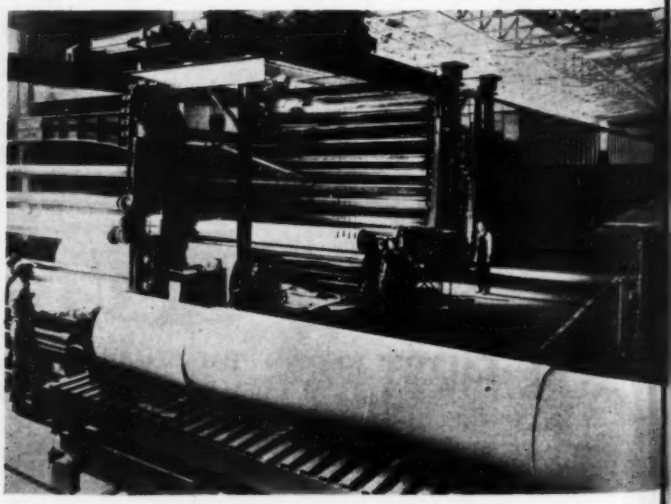
Expanded plastics manufacturing facilities have enabled Bakelite Corporation, a unit of Union Carbide and Carbon Corporation, to increase average productive capacity by approximately 50 to 60 per cent during 1948.

The expansion program includes the completion of an entirely new plant at Ottawa, Illinois, which processes vinyl resins into plasticized film, sheeting, and rigid sheets. Construction of the new plant for Belleville, Ontario, Canada, which will produce phenolic

***OLD**—Built in 1909 for Finch, Pruyn and Company at Glens Falls, New York, this 150-in newsprint machine, capable of operating at 700 fpm, was designed and built by The Pusey and Jones Corporation*

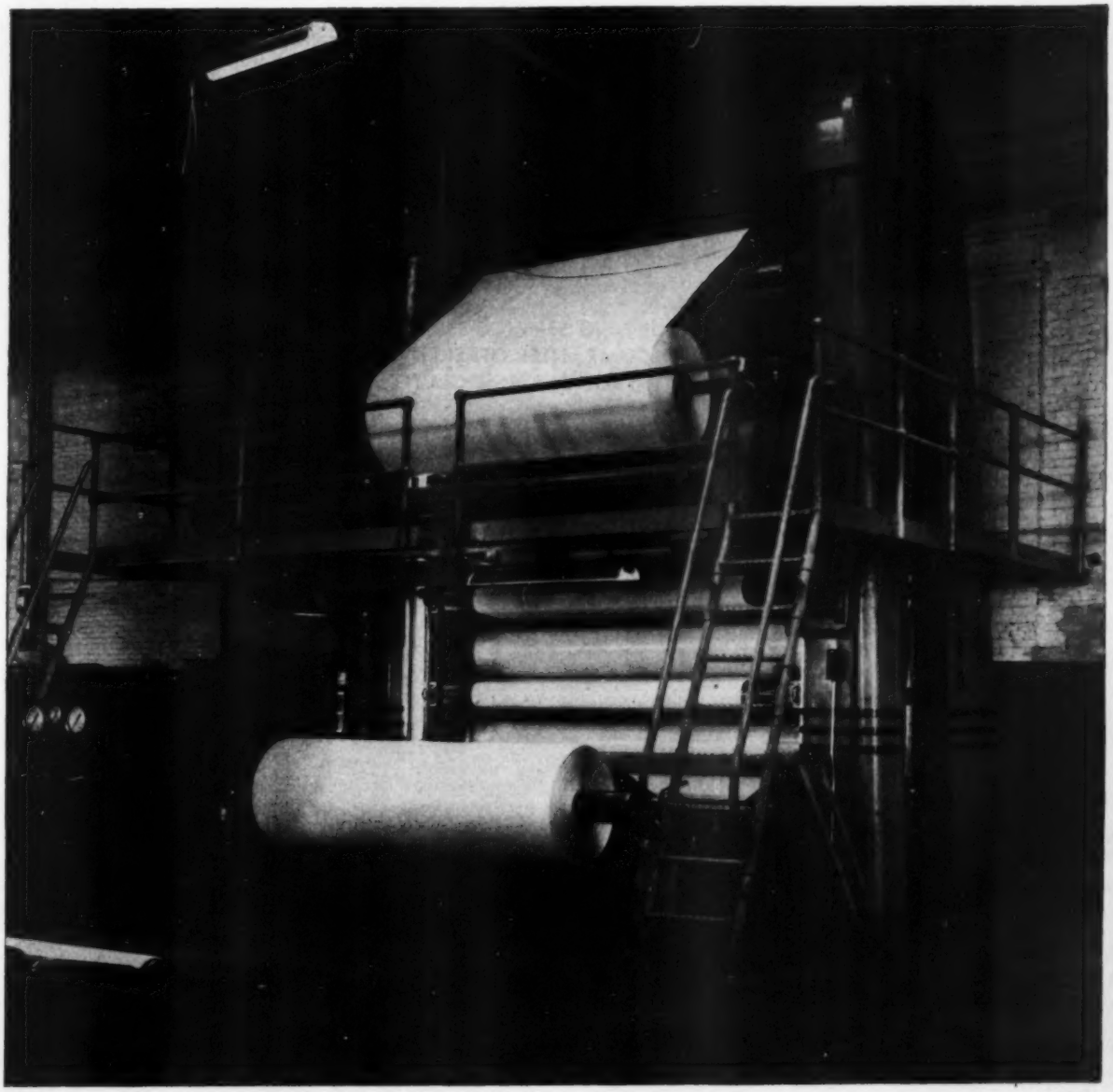


***NEW**—Designed for speeds up to 1400 fpm on book paper, this 245-in Pusey and Jones machine was built in 1945 for the Canton, North Carolina, mill of the Champion Paper and Fiber Company*



APPLETON

SUPERFINISHING EQUIPMENT



SINCE A 1883

120 INCH APPLETON SUPER STACK finishing machine coated book. Designed for speeds up to 2000 feet per minute and pressures to 2000 pounds per linear inch at the nip. Ten rolls, filled rolls of APPLETON N.P. Cotton. Finger-tip control of speed, hydraulic pressure and tension. Anti-friction bearings throughout. Equipped with APPLETON Standard Unwind and Windup Reels with electric tension regulators. Enclosed oil feed system. Operating and safety features.

THE APPLETON MACHINE COMPANY • APPLETON • WISCONSIN

Eastern Sales: CASTLE & OVERTON, Inc., 630 Fifth Avenue, New York • Western Sales: PACIFIC COAST SUPPLY CO., San Francisco • Portland

plastics and resins and urea resin adhesives is under way, and is expected to be in production by the latter part of 1949. Construction was also started on a woodflour plant at West Bath, Maine, and should be completed about the middle of 1949.

Plant facilities at South Charleston, West Virginia; Texas City, Texas; and Bound Brook, New Jersey; have been expanded to increase production of vinylite resins, polyethylene resins, phenolic molding materials and other phenolformaldehyde products.

▼

WORTHINGTON PUMP TAKES OVER SUBSIDIARY COMPANY

The manufacturing and distributing activities of the Ransome Machinery Company, a subsidiary of Worthington Pump and Machinery Corporation, Harrison, New Jersey, is now being conducted by the parent corporation.

Manufacturing operations for the lines previously manufactured by Ransome will be carried on at Worthington's Dunellen, New Jersey, works, the same location formerly used by Ransome Machinery Company. Sales activities will be directed from Worthington's executive offices at Harrison, through the Ransome Sales Division located at the Dunellen works.

▼

▶▶▶ TO INVESTIGATE, in a long-range program, major problems related to the technology of fine wire products, the National-Standard Company of Niles, Michigan, has established an Industrial Fellowship at Mellon Institute in Pittsburgh, Pennsylvania. The fellowship is headed by Charles H. T. Wilkins, formerly metallurgist with the Copperweld Steel Company.

▼

NEWLY ORGANIZED PROCESS INDUSTRIES ENGINEERS OFFER UNIQUE SERVICE

A new and unique service to the chemical industry and processing field has been promised with the organization of Process Industries Engineers, Inc., Pittsburgh, Pennsylvania.

The company announces its plan to integrate two complementary services; first, the sale of equipment of various nationally known manufacturers where engineered applications are satisfactory, and second, the design and fabrication of equipment where special designs are necessary. The company's specialization is in the field of interrelated unit process operations, which include material storage, handling, fluid movement, mixing and agitation, reduction and separation.

The company also will specialize in the fields of impregnation, drying, vulcanization, fumigation, etc., and will design, contract for fabrication, inspect during manufacture, and render technical assistance during plant installation and initial stages of operation.

▼

▶▶▶ THE OPENING of a new sales office in Atlanta, Georgia, has been announced by Stein, Hall & Company, Inc., 285 Madison Avenue, New York City. The manager of the Atlanta office will be E. D. Estes, who has served the organization in this same territory from the Charlotte, North Carolina office. Headquarters will be at 364 Nelson Street, S.W., Atlanta, Georgia and the sales area covered will be the states of Georgia, Alabama and Florida.

▼

CONSULTING SERVICE TO P&P COMPANIES OFFERED BY TRUNDLE ASSOCIATES

The incorporation of a subsidiary company entitled Trundle Associates, Inc., has been announced by the Trundle Engineering Company, Cleveland, Ohio, to take over the business formerly conducted by the late George A. Ware. Mr. Ware served for many years as cost and engineering consultant to the nation's pulp and paper industry.

The new company has opened offices in the Graybar Building, 420 Lexington Avenue, New York, adjoining the New York offices of the Trundle Engineering Company. It will perform a consulting service to pulp and paper companies and associations.

George T. Trundle, Jr., president of Trundle Engineering Company, is the president and active head of the new company. Other officers are Robert Trundle, Neola Van Sittert, A. S. Peck, and C. O. Malpas, all officers and directors of Trundle Engineering Co.

▼

▶▶▶ THE OPENING OF a new district office at 2204 Fannin Street, Houston 5, Texas, has been announced by the Wheelco Instruments Company, Chicago, Illinois. The new office, under the direction of George Hatfield, formerly of the company's Chicago Sales Office, will handle sales and service for the states of Texas, Louisiana and New Mexico.

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▶▶▶ AUTHORIZATION OF an investment of about $3,000,000 to expand facilities for the production of polyvinyl alcohols at its Niagara Falls (N.Y.) plant has been announced by E. I. du Pont de Nemours & Company. Polyvinyl alcohols, solid alcohols in powder form, are versatile synthetic resins for a great variety of industrial applications. Paper sizing and coating are among the major industrial uses.

▼

▶▶▶ SIX EMPLOYEES were admitted to the Quarter Century Club of the Lindsay Wire Weaving Company, Cleveland, Ohio, at a ceremony on the program of the 45th anniversary party. Watches were presented to the new members by A. Fred Crossman, president, as more than 400 persons watched the presentation in the Hotel Cleveland, Cleveland, Ohio.

▼

PENNSALT ANNOUNCES NEW INTERNATIONAL SUBSIDIARY

The organization of Pennsalt International Corporation, a subsidiary of Pennsylvania Salt Manufacturing Company, has been announced. The Corporation will take over the varied foreign interests of the parent company. Richard L. Davies is president of the new firm and John H. S. Barr is vice president.

The new company will import and export chemicals and raw materials. In addition it will perform an invaluable service to American and foreign industry in the exchange of technical information relating to chemical processes. It will handle imports for the parent company, which has been a heavy importer of raw materials for its own chemical production for nearly a century.

Mr. Davies, who joined Pennsalt in 1934, has traveled widely. A chemist by profession, his patents on chemical manufacturing processes are used in the United States and many foreign countries. In World War II he was civilian scientific consultant to Chemical Warfare Service in the European theater.

Vice president of Pennsalt International, Mr. Barr is a licensed engineer who joined the Engineering Department of the parent company in 1929, later transferring to technical sales. His travels in the interest of Pennsalt's export business have taken him into most of western Europe and through South America and the West Indies.

▼

▶▶▶ THE NEW YORK OFFICES of the J. M. Huber Corporation, 342 Madison Avenue, have been expanded to include the office of the director of purchases and the finance and accounting departments of the corporation, formerly located at the Brooklyn plant. Moving to New York are Treasurer R. J. Cashion and his assistants, and Director of Purchases E. M. Krech.

Why Engineered

No single type of dryer felt will meet the needs of all mills. But HOOPERWOOD "Canvas Engineering" has the answer to that problem—a specific HOOPERWOOD Dryer Felt for each requirement.

If it is a rugged, heavy felt you need for fine finish in normal production . . . or a lightweight, extra-porous felt for faster drying . . . or an Asbestos Felt to withstand advanced temperatures in high speed production of Kraft and other heavy papers—there is a HOOPERWOOD felt to fit your need.

Mill Superintendents find this service invaluable in suiting the particular requirements of their mill—even down to each machine position if desired.

Make your next felt *right*—specify HOOPERWOOD.

WM. E. HOOPER & SONS CO.
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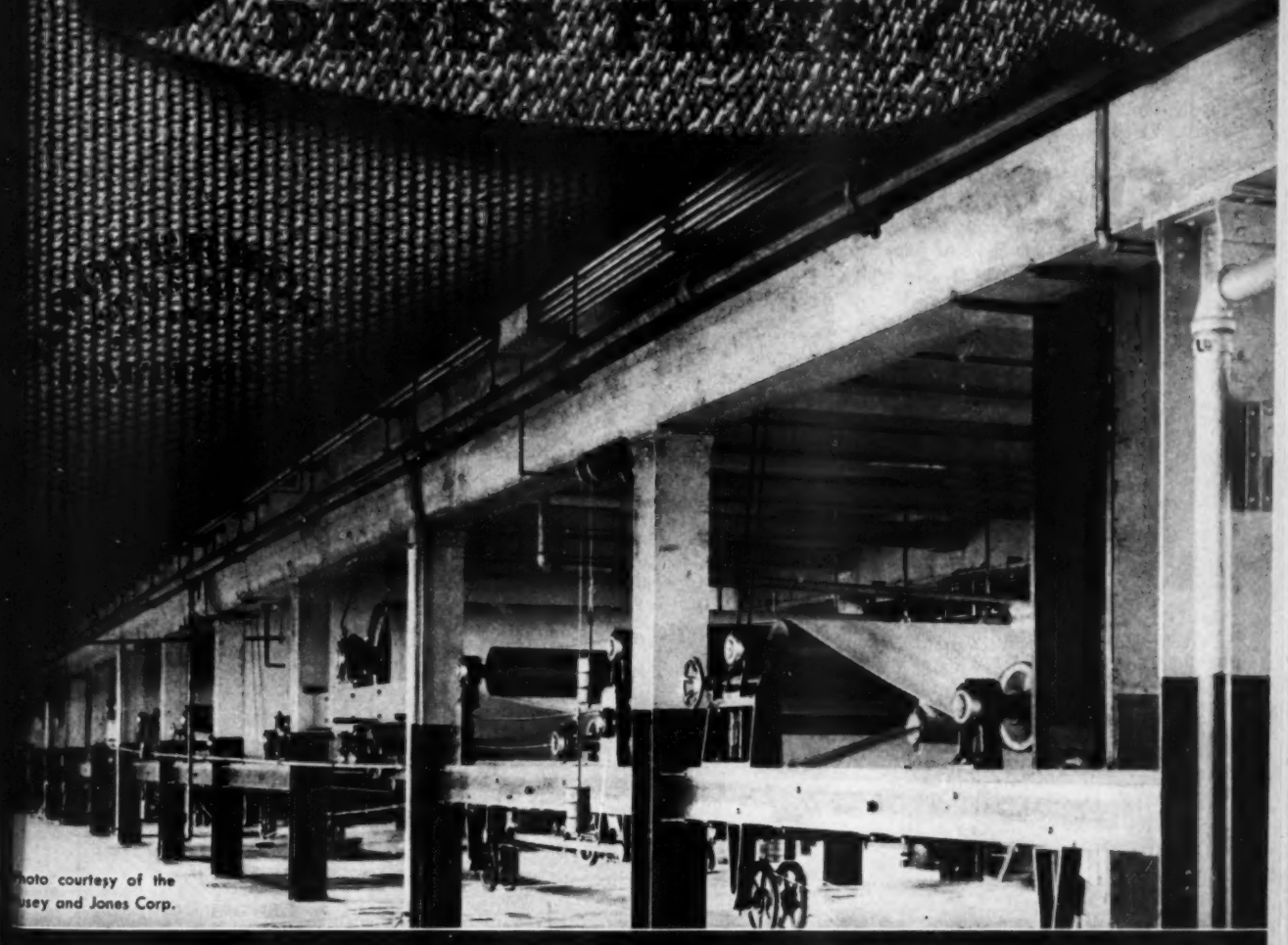

hoto courtesy of the
usey and Jones Corp.

HOOPERWOOD DRYER FELTS
COTTON AND ASBESTOS

PACIFIC COAST DIV. SUPTS. ASS'N HOLDS MEETING IN SEATTLE

Election of officers was one of the highlights at the annual meeting of the Pacific Coast Division of the American Pulp and Paper Mill Superintendents Association, held in Seattle, Washington, last month. Elected chairman was H. Radford Russell, Everett Pulp and Paper Company, Everett, Washington.

Other officers are: L. D. McGlothlin, Crown Zellerbach Corporation, Camas, Washington, vice chairman; L. R. Hartman, Weyerhaeuser Pulp Division, Everett, Washington, second vice president; and A. C. McCorry, St. Regis Paper Company, Tacoma, Washington, third vice president. Fred R. Armbruster, Dow Chemical Company, Seattle, Washington, was re-elected secretary treasurer.

The first day of the meeting brought trips to a number of pulp and paper plants at Tacoma and Everett, Washington.

The technical program on the morning of the second day included a panel discussion conducted by Mr. McCorry and N. W. Coster, Soundview Pulp Company, Everett, Washington. R. I. Thieme, Soundview Pulp Company, discussed "Recovery of Heat and Sulfur Dioxide from Sulphite Bow Pit Gasses," James C. Hayes, Everett Pulp and Paper Company, discussed "Chips from Veneer Waste," and Art Palmer, Crown Zellerbach Corporation, West Linn, Oregon, spoke on "Groundwood."

At the luncheon, with Gerald Alcorn, Weyerhaeuser Pulp Division, Longview, Washington, as toastmaster, William H. Brydges, a past president of the National Superintendents Association, brought a message from that group. Howard W. Morgan, Weyerhaeuser Pulp Division, spoke on "Observations of European Paper Mills."

The afternoon technical program was conducted by Erik Ekholm, Puget Sound Pulp and Timber Company, Bellingham, Washington; Gus Ostenson, Crown Zellerbach Corporation, Camas, Washington; and A. S. Vigers, Simpson Logging Company, Shelton, Washington. Speakers were H. W. Wymore, Crown Zellerbach Corporation, Port Townsend, Washington, who spoke on "Effect of Applications of Starches, Gums and Resins on Paper Quality," Mr. Vigers spoke on the "Manufacture of Soft Board from Sawmill Waste," William Clark, Longview Fibre Company, Longview, Washington, on "Refining," and Mr. Ekholm's speech was entitled "A Discussion of the Various Types of Pulp Dryers."

The evening banquet honored Charles E. Ackley, national third vice president of the Superintendents Association.

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ANNUAL MEETING OF AMER. METALLIZING CONTRACTORS ASS'N IS HELD IN SOUTH

The annual meeting of the American Metallizing Contractors Association was held at Tulsa, Oklahoma, on December 2, 3, and 4.

Peter G. Dennison

Newly elected officers are: Peter G. Dennison, Metal Spraying Corporation, Milwaukee, Wisconsin, president; K. B. Smith, Dix Engineering Company, Inc., vice president; and Walter B. Meyer, John Nooter Boiler Works Company, St. Louis, Missouri, re-elected as secretary treasurer.

The next meeting of the association will be held in Milwaukee, Wisconsin, on May 5, 6, and 7, 1949.

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▶▶▶ GUEST SPEAKER at the December 2 (1948) meeting of the Miami Valley Division of The American Pulp and Paper Mill Superintendents Association was F. A. Soderberg, of General Dyestuff Corporation, New York City. The subject covered by the speaker was that of Latest Developments in Slime Control. He spoke extemporaneously but handled his topic in a unique manner. The meeting was held at the Anthony Wayne Hotel, Hamilton, Ohio.

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▶▶▶ RECENT EQUIPMENT developments for application to board machines, as well as to other types of papermaking machines were discussed by Philip H. Goldsmith in an address before the dinner meeting of the Michigan Division of The American Pulp and Paper Mill Superintendents Association, held in Kalamazoo December 16 (1948). Mr. Goldsmith, who is sales and development engineer with The Pusey and Jones Corporation, Wilmington, Delaware, particularly

Toilet-Towels
let
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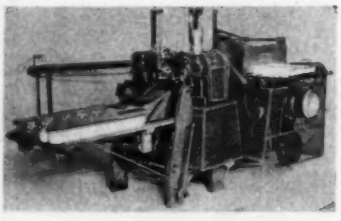
Roll Wrappers



(Model DD)

pace your production

The C. A. Lawton Company
Broadway-East **DePere, Wis.**

stressed the Flow-Spreader, a mechanical arrangement designed to spread out the flow of stock across the entire width of a paper machine; a paper machine dryer, not yet in commercial production; and a pneumatically-operated press, designated as the Simplex, for board machines. Herbert B. Johnston, chairman of the Division, presided at the meeting.

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▶▶▶ THE ANNUAL alumni University of Maine luncheon will take place on Wednesday, February 23, at the Hotel Commodore during the TAPPI convention which will be held in New York, February 21 to 24, 1949. This luncheon is held during Paper Week and is open to University of Maine alumni and their guests.

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CANADA'S MAIN WEALTH IS FOUND IN P. & P. INDUSTRY

Figures have been released by the Canadian Pulp and Paper Association, in co-operation with Canada's dominion bureau of statistics which place the pulp and paper industry first as a source of wealth in the Dominion. With a current output of $800,000,000 a year, Canada produces five times as much newsprint as any other country.

The report states that the 82 companies which operate 115 mills in the six provinces have the highest employment of any industry in the country and stand first in wages paid and first in capital invested.

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▶▶▶ AT THE ANNUAL meeting of the Association of American Wood Pulp Importers, held in New York City, the following officers were re-elected for the ensuing year: James Donaldson, president; S. G. Blankinship, vice president; George N. Dutcher, secretary; V. Ramsay, treasurer; and Rolf G. Westad, director.

▼

COMING EVENTS

Feb. 9—Annual meeting of the Southern Pulpwood Conservation Association will be held at the Atlanta Biltmore Hotel, Atlanta, Georgia.

Feb. 20-25—Annual meeting of the American Paper and Pulp Association and paper groups, at the Waldorf-Astoria Hotel, New York City.

Feb. 20-25—Annual meeting of the Technical Association of the Pulp and Paper Industry, at the Commodore Hotel, New York City.

Apr. 8—TAPPI (Pacific Section) will meet in Longview, Wash.

June 15-17—Annual convention of the Superintendents Association will be held at Chalfonte-Hadden Hall, Atlantic City, New Jersey.

MATERIAL HANDLING *News*

When a thorough study of their materials handling and shipping methods revealed many opportunities for substantial savings, The Coleman Company, Inc., appliance manufacturers of Wichita, Kansas, installed a completely mechanized handling system planned around the Clark PUL-PAC.

The survey disclosed a conspicuous need for an efficient method of moving Coleman appliances—lanterns, camp stoves and other small items—from production to "live" storage, 1200 feet distant; for storing them in critically limited space and moving them thence to rail cars and motor trucks for shipment. Under the old system, this required as many as five individual handlings. Under the new method, the various items as they come from packaging

Clark Pul-Pac tiers a load of 98 lanterns at the Coleman Company, Inc., Wichita, Kansas.

machines are assembled in unit loads on trailers, utilizing 44" x 48" fiber sheets as load bases. Industrial tractors haul the trailers to the shipping department where the Clark PUL-PAC removes the unit loads from the trailers and tiers them in temporary storage. Finally, the PUL-PAC transfers the loads to the shipping department for order assembly.

Immediate benefits achieved through the new method were elimination of three to five handlings with comparably less damage to merchandise; a new and "highly satisfactory" shipping system; multiplication of available storage space through use of "air rights."

There may be similar undiscovered opportunities for important savings in your plant. It costs nothing to discover them if you Consult Clark.

Eliminated
3 to 5 INDIVIDUAL HANDLINGS

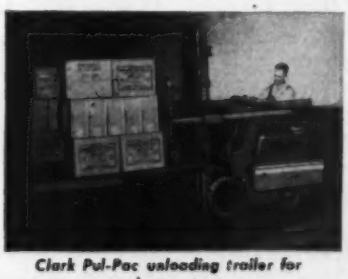
Reduced
HANDLING COSTS

Cut
DAMAGE LOSSES

Saved
STORAGE SPACE

APPLIANCE MANUFACTURER ACHIEVED ALL THESE BENEFITS BY INSTALLING THE CLARK

PUL-PAC



Clark Pul-Pac unloading trailer for warehouse storage.

CLARK ELECTRIC AND GAS POWERED FORK TRUCKS AND INDUSTRIAL TOWING TRACTORS

INDUSTRIAL TRUCK DIV., CLARK EQUIPMENT COMPANY BATTLE CREEK 22 MICH.
REPRESENTATIVES IN PRINCIPAL CITIES THROUGHOUT THE WORLD
AUTHORIZED CLARK INDUSTRIAL TRUCK PARTS AND SERVICE STATIONS IN STRATEGIC LOCATIONS

S A F E T Y

SAFETY CONTEST SCORES

▶▶▶ The lowest rate in the present contest shows an injury frequency rating of 10.74 for all contestants representing the third consecutive monthly decrease. Summary of the rate for November is as follows:

Division I—10.37 as compared with the five month rating of 11.67.

Division II—12.65 as compared with 13.11, the last five months average rating. The list of perfect scores at the end of November totals 49 as follows:

Division I—Paper and Pulp Mills

Group A

Mead Corporation, Chillicothe, Ohio.

Group B

West Virginia Pulp & Paper Co., Tyrone, Pa.

Howard Smith Paper Mills, Ltd., Beauharnois, Que., Canada.

Crown-Zellerbach, Corp., Port Angeles, Wash.

Group C

Price Bros. & Co., Ltd., Jonquiere, P.Q., Canada.

Certain-teed Products Corp., York, Pa.

Group D

Certain-teed Products Corp., Niagara Falls, N.Y.

Container Corp. of America, Carthage, Ind.

Hollingsworth & Whitney Co., Waterville, Me.

Armstrong Cork Co., Pensacola, Fla.

Certain-teed Products, Richmond, Calif.

Hollingsworth & Vose Co., West Groton, Mass.

Manistique Pulp & Paper Co., Manistique, Mich.

Marathon Corp., Ashland, Wis.

National Gypsum Co., Kalamazoo, Mich.

Mead Corp. (Wheelwright Div), North Leominster, Mass.

Strathmore Paper Co. (Mill No. 1), Woronoco, Mass.

Container Corp. of America (Calif. Container Div.) Los Angeles, Calif.

American Writing Paper Corp. (Albion Div.), Holyoke, Mass.

Fort Wayne Corrugated Paper Co., Vincennes, Ind.

Riegel Paper Corp., Riegelsville, N. J.

National Gypsum Co., Newburgh, N. Y.

American Writing Paper Corp. (Mt. Tom Div.), Holyoke, Mass.

Kimberly-Clark Corp. of Canada, Ltd., Kapuskasing, Ont., Canada.

Spaulding Fibre Co., Inc., North Rochester, N. H.

International Paper Co., Livermore Falls, Maine.

American Writing Paper Corp. (Crocker Div.), Holyoke, Mass.

Division II—Paper and Board Remanufacturing

Group A (None)

Group B

Canadian Cellucotton Products Co., Ltd., Niagara Falls, Ont., Canada.

Container Corp. of America, Cleveland, Ohio.

Container Corp. of America, Anderson, Ind.

Group C

Allied Paper Mills (Bardeen Div.), Kalamazoo, Mich.

Gaylord Container Corp., Atlanta, Ga.

Kimberly-Clark Corp., Appleton, Wis.

Marinette Paper Co., S. Glen Falls, N. Y.

South West Box Co., Sand Springs, Okla.

Gaylord Container Corp., Tampa, Fla.

Thilmany Pulp & Paper Co. (Bag Mill), Kaukauna, Wis.

Research Products Corp., Madison, Wis.

Certain-teed Products, Buffalo, N. Y.

Hankins Container Corp., Chicago, Ill.

Orchard Paper Co., St. Louis, Mo.

Pillsbury Mills, Inc., Wellsburg, West Va.

Green Bay Box Co., Green Bay, Wis.

Flintkote Co., Hollywood, Calif.

Bay West Paper Co., Green Bay, Wis.

Container Corp. of America, Atlanta, Ga.

Certain-teed Products, Dallas, Tex.

Certain-teed Products, Kansas City, Mo.

ABC Corrugated Box Co., Minneapolis, Minn.

▼

P&P INDUSTRY ACCIDENTS ON PACIFIC COAST ARE DOWN 45% IN 3 YRS.

Industrial accidents in the pulp and paper industry on the Pacific Coast have been reduced 45 per cent in the last three years. This was revealed at the third annual Labor-Management Safety Conference of the California pulp and paper industry early in December, attended by 200 delegates.

The combined efforts of 33 mills and 15,000 workers have reduced accidents from 27 to 15 injuries per 1,000,000 man-hours since the safety meetings were started. California, which already has a good record, dropped 23 per cent, from 17 to 13.

Speakers at the meeting included: R. S. Wirthheimer, secretary-treasurer of the Pacific Coast Association of Pulp and Paper Manufacturers; John Sherman, vice president of the International Brotherhood of Pulp, Sulphite and Paper Mill Workers; Otto Hartwig, general safety supervisor, Crown-Zellerbach Corporation; and Al Brown, vice president of the International Brotherhood of Paper Makers.

STEBBINS Semtile tanks are constructed of cored Semtile with steel reinforcement, both vertically and horizontally. The cores are solidly filled with concrete so that the resulting structure is a reinforced concrete wall, faced on both sides with a corrosion resistant vitrified glazed tile. There are no through joints in a Semtile tank, either horizontally or vertically.

The Semtile salt-glazed cored tile presents a smooth, easy to clean surface which is impervious to the corrosive action of stock slurries.

At the price of materials today, a Semtile tank costs no more than a concrete, lined steel, wood or ordinary tile tank.

They pay dividends year after year through dependable service.

Stebbins Engineering and Manufacturing Company
EASTERN BOULEVARD WATERTOWN NEW YORK

Simplify valve selection...

WITH THIS

LUNKENHEIMER

"RENEWO" THREESOME!

The "RENEWO" Threesome is fully described in Circular No. 577, which also explains the economy feature of converting one type to another by simply changing seat and disc. A copy is yours for the asking . . . from your Lunkenheimer Distributor or from us direct.

ESTABLISHED 1862

THE LUNKENHEIMER CO.

"QUALITY"

CINCINNATI 14, OHIO, U. S. A.

NEW YORK 13 CHICAGO 6

BOSTON 10 PHILADELPHIA 34

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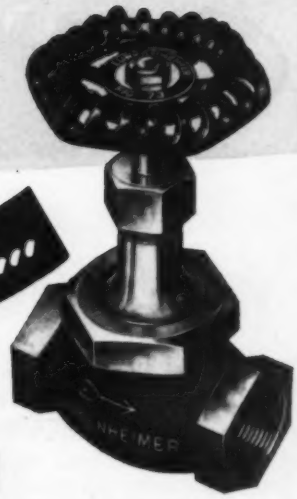
YOUR LUNKENHEIMER DISTRIBUTOR . . .

Provides Better Valve Service . . . Lunkenheimer Distributors are located in the principal industrial centers. There is one near you, fully equipped and ready at all times to assist with your maintenance and operation problems. Call on him.

1 REGULAR TYPE...



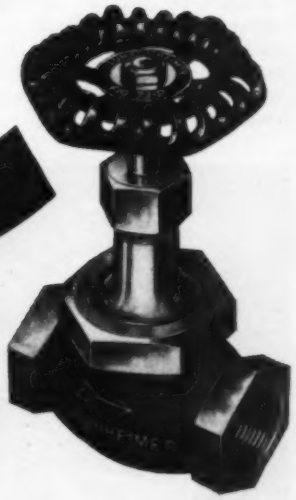
Nickel Alloy Seat and Disc

Fig. 73 200 lb. S.P.

Fig. 73-16 300 lb. S.P.

Regular "RENEWO": one of the most popular and widely used valves ever designed for general service. As the name clearly implies, all parts are renewable.

2 "P" TYPE...



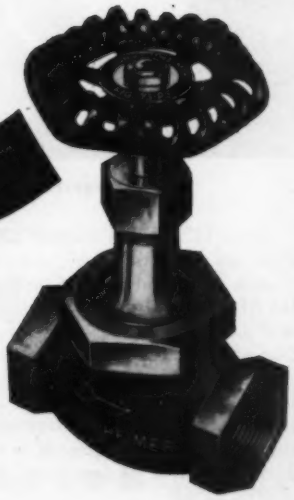
Nickel Alloy Seat and Disc

Fig. 73-P 200 lb. S.P.

Fig. 16-P 300 S.P.

"P" (Plug Type) "RENEWO": for throttling, drain, drip, water column blowdown and similar service. The "NS5" Nickel Alloy 330 Brinell seating material, developed and patented by Lunkenheimer, has exceptional wearing qualities and high corrosion resistance.

3 "PS" TYPE...

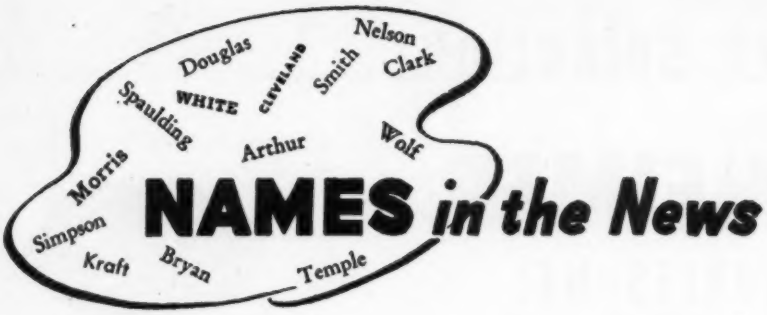


Stainless Steel Seat and Disc

Fig. 73-PS 200 lb. S.P.

Fig. 16-PS 300 lb. P.S.

"PS" (Plug Type) "RENEWO": for maximum resistance to the effects of close throttling and other severe service, particularly where abrasive conditions are encountered. Equipped with stainless steel 500 Brinell seat and disc.



PERSONALS

FERGUSON NOW HEADS BOARD, ST. REGIS—STILL RETAINS PRESIDENCY

Directors of St. Regis Paper Company at a meeting last month acted on a number of executive changes. Following the meeting, announcement was made that Roy K. Ferguson would assume the position of the chairman of the board, which has been vacant, and would also continue to act as president.

Roy K. Ferguson

James H. Allen, a director and president of the company's subsidiaries, Florida Pulp and Paper Company and the Alabama Pulp and Paper Company, was named to the newly created position of vice chairman of the board.

Announcement was also made of the resignations of Carl B. Martin and Lyman A. Beeman as vice presidents and the appointments of Benton R. Cancell and William R. Adams as vice presidents.

H. H. CHAPMAN AWARDED WILLIAM SCHLICH MEDAL

Professor emeritus of forest management at Yale University and past president of the Society of American Foresters, Herman Haupt Chapman of New Haven, Connecticut, was awarded the Sir William Schlich memorial medal at the annual meeting of the Society held in Boston, Massachusetts. Presentation of the medal to Dr. Chapman was made by Clyde S. Martin, president of the Society of American Foresters and manager of forestry relations for the Weyerhaeuser Timber Company, Tacoma, Washington.

In honor of the Sir William Schlich, an eminent international leader in forestry, a fund was established fifteen years ago by foresters of English-speaking nations in recognition of Sir William's great services to forestry. The Society of American Foresters is custodian of the periodic grants made to the United States by the Schlich Memorial Foundation, and from time to time awards the medal for noteworthy achievement in the advancement of forestry.

A graduate of the University of Minnesota in 1899 in science and agriculture, Dr. Chapman obtained the master of forestry degree at Yale in 1904, and then entered the Bureau of Forestry. He joined the faculty of Yale in 1906. Elected a Fellow of the Society of American Foresters in 1933, he served as president of that organization during the period 1934-1937. In 1947, the degree doctor of science, honoris causa, was conferred upon him by the University of Minnesota.

▼

NEW MEMBERS ELECTED TO BOARD OF HUYCK & SONS

At a meeting of the board of directors of F. C. Huyck & Sons, Rensselaer, New York, William Greeley, treasurer, and Roderick T. Clarke, secretary, were elected to the board.

Mr. Greeley has been with the company since 1920, following his graduation from Union College. First serving as assistant to the head of the cost department, he later became sales representative in the papermakers' felt division. He was sales manager of this division from 1930 until his election as treasurer in 1948.

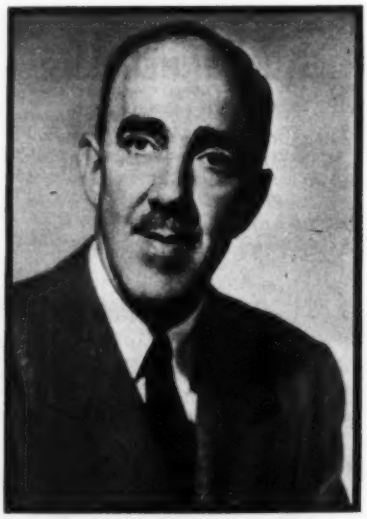
After several years of association as legal counsel, Mr. Clarke joined the company as secretary in 1947. He was formerly with Rathbone, Perry, Kelley and Drye of New York City.

▼

▶▶▶ Formerly connected with the St. Croix Paper Company, Calais, Maine, and the Byron Weston Company, Dalton, Maine, *James Craig Smith,* treasurer of Eaton Paper Corporation, Pittsfield, Massachusetts, has been appointed Eaton's general plant manager.

▼

▶▶▶ With the Michigan Carton Company, Battle Creek, Michigan, since 1927, *Marvin C. Jones* has been named manager of the Weyerhaeuser Timber Company's new sulphate pulp and container board plant at Springfield, Oregon. Mr. Jones has been in charge of



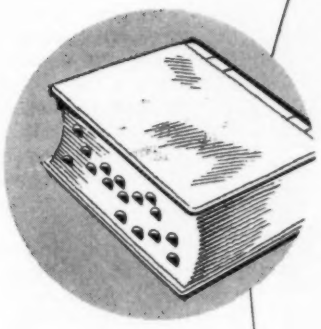
Marvin C. Jones

engineering, laboratories and purchasing for the Michigan Carton Company since 1934, and played an important part in the construction of the new 250-ton board mill which began operation in June, 1948. He will assume his new duties shortly after the first of this year.

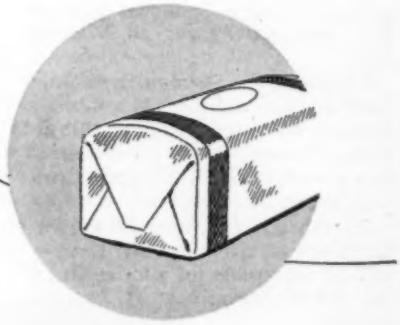
▼

▶▶▶ Widely known in the coarse paper and building maintenance supply field, *Wesley C. Swan* has been appointed as general manager of the Miller Paper Company. Mr. Swan has been with the Sanitary Products and Paper Company, division of Crown-Zellerbach Corporation, for more than 25 years.

TITANOX PIGMENTS



impart higher opacity to all types of paper



The excellent opacifying, whitening and brightening results contributed to lightweight and waxed stock by TITANOX pigments are also imparted to publication papers. Here, a reduction of "show-through" and higher printing opacity are available through the use of these famous titanium dioxide pigments. Thus, the attractiveness of printed messages and illustrations is greatly enhanced.

Our Technical Service Laboratory staff members will be glad to discuss with you the possibility of creating greater sales-appeal in your paper with TITANOX pigments... and doing it economically. Call or write our nearest office. Titanium Pigment Corporation, 111 Broadway, New York 6, N. Y.; 104 So. Michigan Ave., Chicago 3, Ill.; 2600 So. Eastern Ave., Los Angeles 22, Calif. Branches in all principal cities.

®TITANOX

the brightest name in pigments

TITANIUM PIGMENT CORPORATION

Subsidiary of NATIONAL LEAD COMPANY

DABNEY APPOINTED MGR. OF EASTERN DISTRICT BY HARRIS-SEYBOLD CO.

Responsibility for the administration of sales and service on Harris presses, Seybold cutters and allied lines has been given to J. C. Dabney, as he was appointed district manager in charge of the Eastern District of the Harris-Seybold Company, Cleveland, Ohio. Mr. Dabney's ten years experience with Harris-Seybold makes him particularly well equipped for his new position.

Within a year after he joined the Seybold Division in 1939, Mr. Dabney was made division sales manager and in 1944 he was brought to the general offices in Cleveland as assistant manager of sales.

J. W. Valiant, vice president, now on leave due to illness, has been in charge of the company's Eastern District for the past 26 years.

J. C. Dabney

▼

WHITING CORP. APPOINTS KEARNEY AS MANAGER OF SWENSON EVAPORATOR DIV.

Promotion of James E. Kearney to manager of the Swenson Evaporator Company Division has been announced by the Whiting Corporation, Harvey, Illinois. He succeeds G. E. Seavoy, who on November 1 assumed charge of field sales activity for all Whiting lines.

Coming to the Swenson Division in 1943 as chief engineer, Mr. Kearney also served as sales manager to that division. Before coming to Swenson, he was with the H. K. Ferguson Company as a project engineer.

As manager of the Swenson Evaporator Company Division, Mr. Kearney will be responsible for sales engineering and development of all Swenson products.

J. E. Kearney

▼

SALMONSON IS NOW PACIFIC COAST CHEMIPULP REPR.

Announcement has been received of the appointment of S. A. Salmonson as Pacific Coast representative for Chemipulp Process, Inc., Watertown, New York, also Chemipulp Process Ltd., Montreal, P. Q.

Mr. Salmonson is well known throughout the industry. For twelve years he was assistant general superintendent of the Soundview Pulp Company, Everett, Washington. In 1945, he was accepted as a life member of the American Pulp and Paper Mill Superintendents Association.

For the present, Mr. Salmonson's address will be Gralyn Court Apartments, Lincoln Beach, Oregon.

S. A. Salmonson

C. L. HUSTON BEGINS 74th YEAR WITH LUKENS STEEL

A unique record in the annals of American industry is maintained by Charles Lukens Huston as he begins his 74th year of continuous service with Lukens Steel Company, Coatesville, Pennsylvania. Mr. Huston, grandson of Dr. Charles and Rebecca Lukens, for whom the company is named, started with the concern on December 15, 1875, as a clerk and bookkeeper in its offices. Today at 93, he is first vice president.

Actually, Mr. Huston's association with the steel company reaches 78 years, for in his teens he wheeled coal and helped with other mill chores, without pay, while he was on summer vacations from school.

Mr. Huston played an important part in the development of the firm. He is the patentee of several highly regarded inventions used in the manufacture of steel and he planned and designed Lukens four-high 206-inch mill, world's largest plate mill, and was largely responsible for the installation of the first head-spinning machine at Lukens, during the years (1882-1925) when he was in charge of plant operations. He was elected vice president in 1897, and from 1917 to 1925, he was vice president and works manager. In 1925, he relinquished the position of works manager but continued as first vice president, a position in which he still serves.

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UNIV. OF PENNSYLVANIA APPOINTS DARD HUNTER FELLOW IN BIBLIOGRAPHY

World renowned authority on the history of paper and its manufacture, Dr. Dard Hunter, has been appointed the Rosenbach Fellow in Bibliography at the University of Pennsylvania for the year 1948-1949.

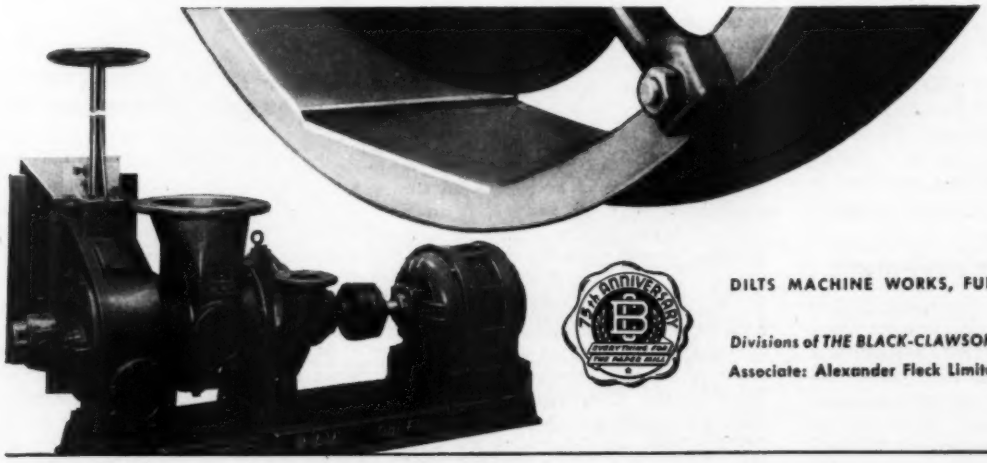
Dr. Hunter, director of the Paper Museum at the Massachusetts Institute of Technology, will deliver two lectures at the University. The first lecture will treat the Far East method of making paper by hand from its beginning 2000 years ago. The second lecture will be based on early American papermaking in Pennsylvania and other early settlements.

Dr. Hunter is the author of many books on the subject of papermaking, including *Papermaking, the History and Technique of an Ancient Craft*, the second enlarged edition of which was published recently. He has traveled extensively throughout the world, especially in the Orient, investigating the origins of paper. In 1937 he established the School of Papermaking in Madras, India. In this country, at

Proper agitation involves chests of correct design and the type of equipment the conditions require. Should it be a square chest, a rectangular chest, a cylindrical chest? Will a standard propeller, or a special propeller, inside the chest work best? Perhaps a horizontal combination agitator and pump (Agi-Flo) or a vertical version of the same, installed outside the chest, will give best results.

In short, there is more to agitation than just stirring the stock—enough more to justify the Shartle claim that *an agitation layout should be engineered.*

Shartle can supply the engineers. Shartle can furnish the equipment. And since Shartle builds a complete line of equipment for agitation needs, the chips fall where they may when making recommendations.



DILTS MACHINE WORKS, FULTON, NEW YORK

Divisions of THE BLACK-CLAWSON CO., HAMILTON, OHIO

Associate: Alexander Fleck Limited, Ottawa, Canada

SHARTLE BROS. MACHINE CO., Middletown, Ohio

Lime Rock, Connecticut, he has founded a mill for the manufacture of paper by hand, and has also designed and cast the type for the printing of his books.

▼

DOANE NEW VICE PRES. INTERNATIONAL PAPER

Following a meeting of International Paper Company, New York, directors, it was announced that Richard C. Doane had been elected vice president in charge of sales. He returned to New York from Montreal and resigned as vice president and general manager of Canadian International Paper Company.

R. C. Doane

Joining the International Paper Company sales department in 1924, Mr. Doane became assistant to the sales manager in the next year. In 1928 he was appointed manager of the Newsprint Division and in 1929 vice president of International Paper Sales Company, Inc.

In 1938, he moved to Montreal, and in 1941 was elected president of the Sales Company. He was also a vice president and a director of Canadian International Paper Company and in 1947 was appointed general manager.

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CHANGES AT HERCULES

Three changes in key administrative personnel of Hercules Powder Company's Cellulose Products Department, Wilmington, Delaware, were announced. J. B. Wiesel, who has been director of sales since 1930, will become assistant to the general manager. Carl W. Eurenius will succeed Mr. Wiesel as director of sales, and A. R. Olsen has been named manager of plastics promotion.

Beginning his career as a chemist 33 years ago, Mr. Wiesel has been director of sales of the Cellulose Products Department since 1930. He was superintendent of Hercules' Parlin, New Jersey, plant from 1921 until 1925, when he became technical service manager of the Cellulose Products Department.

The new director of sales, Mr. Eurenius, joined Hercules in June, 1942. From 1942 to 1946 he was engaged in technical service and sales work in the Cellulose Products Department. For the past two years, he has been manager of the company's sales research division.

Mr. Olsen, as manager of plastics promotion, will be in charge of the promotion of cellulose acetate and ethyl cellulose in the plastics industry.

▼

▶▶▶ Becoming associated with Joseph T. Ryerson & Son, Inc., Chicago, in 1941, *C. H. Hallett* has been appointed manager of sales at the Los Angeles plant. Following his graduation from Northwestern University, Mr. Hallett became a member of a special training group at Inland Steel Company where he secured experience in practically all phases of steel operations.

▼

▶▶▶ Promoting the application and sales of Amyliq, an enzyme product for preparing sizings, coatings, and adhesives from starch, *Frank A. Taberski* has joined the Wallerstein Company, Inc., New York City. Before joining the company, Mr. Taberski was chief chemist in the coating department of the Imperial Paper and Color Corporation.

▼

▶▶▶ With headquarters at 502 Oliver Building, Pittsburgh, Pennsylvania, *L. J. Suelzer* has been appointed manager of the newly created Bower Pittsburgh District Office. *T. R. Schannen* has assumed Suelzer's former position as manager of the Lubrication and Filtration Sales Division at the home office in Fort Wayne, Indiana. *C. P. Menard,* with Bowser, Inc., since 1924, has been lubrication and filtration engineer stationed in Pittsburgh since 1937. In his new duties he will be sales engineer reporting to Mr. Suelzer.

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▶▶▶ Directing the activities of a nationwide industrial field staff, *Frank L. Oldroyd* has been appointed sales manager of the Industrial Division of Oakite Products, Inc., New York, N.Y. He has been associated with the servicing of specialized industrial cleaning and alied materials for over fifteen years, having spent eleven of them as an Oakite field service territorial representative in various sections of the country. Promotions found his acting in the capacity of division manager in Atlanta and Chicago for two and one-half years, then as special field sales manager for a year prior to his most recent appointment.

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JOSEPH KELLEY APPOINTED PATTERSON DIV. SALES MGR.

Taking charge of the sale of specially designed chemical and process apparatus, Joseph W. Kelley has been appointed division sales manager of the Special Equipment Division of the Patterson Foundry and Machine Company, East Liverpool, Ohio.

Jos. W. Kelley

A chemical engineer and a graduate of the University of Alabama, Mr. Kelley was formerly assistant sales manager of Goslin-Birmingham Company, Birmingham, Alabama. His headquarters will be East Liverpool.

▼

NEW OFFICERS APPOINTED BY NEKOOSA-EDWARDS CO.

Three new officers have been appointed by the Nekoosa-Edwards Paper Company, Port Edwards, Wisconsin, to fill the offices vacated by the resignation of C. A. Jasperson. The board of directors has announced Walter A. Radke as treasurer, Harry Deyo as assistant treasurer and controller and Sam A. Casey as secretary of the company.

Mr. Radke, who has been closely associated with the company's activities for some time, will continue his office as president and director of the Nekoosa-Port Edwards State Bank. He is, in addition, vice president of Nepco Foundation.

Starting in the paper mill in 1918, Mr. Deyo's practical experience in-

Sure, America's going ahead...

if we all pull together!

Let's compare *yesterday* with *today* . . . that will give us an idea of what tomorrow can be!

Machine Power: Since 1910 we have increased our supply of machine power *4½ times.*

Production: Since 1910 we have more than *doubled* the output each of us produces for every hour we work.

Income: Since 1910 we have increased our annual income from less than $2400 per household to about $4000 (in dollars of the same purchasing power.)

Work Hours: Yet, since 1910 we have cut 18 hours from our average workweek—equivalent to two present average workdays.

HOW have we succeeded in achieving all this? Through the American kind of teamwork! And what is *teamwork?*

American teamwork is management that pays reasonable wages and takes fair profits—that provides the best machines, tools, materials and working conditions it possibly can—that seeks new methods, new markets, new ideas; that bargains freely and fairly with its employees.

Our teamwork is labor that produces as efficiently and as much as it can—that realizes its standard of living ultimately depends upon how much America produces—that expects better wages as it helps increase that production.

Teamwork is simply working together to turn out more goods in fewer manhours—making things at lower costs and paying higher wages to the people who make them and selling them at lower prices to the people who use them.

What we've already accomplished is just a foretaste of what we *can* do. It's just a start toward a goal we are all striving to reach: better housing, clothing, food, health, education, with ever greater opportunities for individual development. Sure, our American System has its faults. We all know that. We still have sharp ups and downs in prices and jobs. We'll have to change that—*and we will!*

It will continue to take *teamwork*, but if we work together, there's no limit on what we can all *share together* of even greater things.

What we have already accomplished is just a foretaste of what we *can* do—if we continue to *work together!*

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cludes the laboratories and every phase of office administration. Specializing in costs and accounting, he was appointed assistant treasurer of the company in 1943. He has been particularly active in developing improved methods of cost accounting and has served as a director of the Northern Wisconsin Chapter of the National Association of Cost Accountants.

Associated with the law activities of the company, Mr. Casey has served as counsel and managing head of the law department for the last three years. He was elected to the board of directors in 1947, and is also a director of Nepco Foundation and the Alexander-Clark Timber Company, Ltd. He served as a captain with the Judge Advocate General's Department during World War II and has devoted his full time to his Nekoosa-Edwards responsibilities since his separation from the service.

▼

▶▶▶ Formerly vice president, *N. George Belury* has been appointed president of the Engineered Castings Division of the American Brake Shoe Company, New York City. Mr. Belury has been with Brake Shoe since graduating from Purdue University in 1937. He has served in various sales capacities with Engineered Castings, including that of sales manager.

▼

▶▶▶ Control enginering is the type of work to which *John H. Pearson* is assigned at Shartle Brothers Machine Company, Middletown, Ohio. He has been on the engineering staff at Shartles for two and a half years after serving four years in the Army Signal Corp. Prior to joining the army, he majored in radio and electricity at the University of Cincinnati.

▼

▶▶▶ Associated with the company as cost accountant and cost analyst since 1919, *Claude M. Haggerty* has been appointed assistant general manager of Smith Paper, Inc., Lee, Massachusetts. He is a veteran of World Wars I and II having been discharged from the latter with the rank of colonel after service in the special services distribution department of the First Service Command.

▼

▶▶▶ Former sales representative, *Philip H. Clapp,* has been appointed sales manager of the engineering castings division of the American Brake Shoe Company, New York City. He has been with the company since 1946. He will continue to be located at the division's headquarters in Rochester, New York.

▶▶▶ Former chief chemist of the Falulah Paper Company, Fitchburg, Massachusetts, *Ralph N. Thompson,* has joined the research staff of Calgon, Inc., Pittsburgh, Pennsylvania. In his new position Mr. Thompson will carry on research in the application of phosphate materials in paper manufacture. He was employed in chemical research at the Middlesex Products Corporation, Cambridge, Massachusetts, from 1940 to 1942, then served three and a half years as a Naval Reserve officer.

Ralph N. Thompson

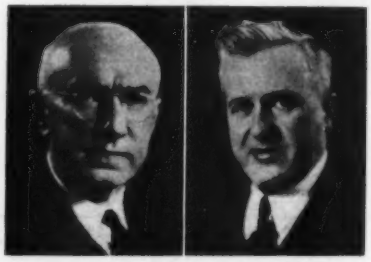
▼

▶▶▶ After a number of years with Joseph T. Ryerson & Son, Inc., *Frank W. Eichman* has been appointed sales manager of the Philadelphia plant. Mr. Eichman started at the New York plant in 1922, was appointed sales representative in the New York area in 1932. In 1938, he moved to the Philadelphia plant where he continued in the capacity of sales representative.

▼

JAMES W. MORAN ELECTED PRES. OF BAKER-RAULANG

It has just been announced that James W. Moran has been elected president of The Baker-Raulang Company to succeed E. J. Bartlett who becomes president emeritus and continues as a director.



E. J. Bartlett (left) and J. W. Moran

Mr. Moran joined the company in 1911 as a clerk in the Stock Record Department. After being employed successively in the Service, Purchasing and Accounting Departments, in 1916 he became auditor. In 1920 he was elected assistant treasurer and, in 1934, secretary, treasurer and director.

Mr. Bartlett, who continues as a director, will serve the management in an advisory capacity.

▼

▶▶▶ Effective January 1, *Frank E. Early* assumed duty as representative of the Askania Regulator Company, Chicago, Illinois, in the Detroit, Michigan, area. Mr. Early, who has worked with Askania equipment in various capacities since 1936, will represent the company for all its products.

▼

▶▶▶ The election of two new members to the board of directors of the E. C. Atkins Company, Indianapolis, Indiana, *Russell L. White* and *Joseph J. Daniels,* has been announced by Elias C. Atkins. Mr. White is president and director of the Indiana National Bank, the White Baking Company, and director of the Union Trust Company of Indianapolis. Mr. Daniels, a member of the law firm of Baker and Daniels, is a director of the Fletcher Trust Company, Indianapolis Water Company, and a member of the board of managers of Crown Hill Cemetery.

▼

▶▶▶ Effective last month, *Dr. Richard E. Chaddock* has been named manager of Hercules Powder Company's Wilmington, Delaware, sales research division. He joined the company in 1945 as a technical assistant in the research department, later serving as liaison between the department's sales development section and the company's sales research division. Mr. Chaddock is a member of the American Chemical Society and the American Institute of Chemical Engineers.

▼

▶▶▶ On the sales staff of the Pure Calcium Products Division, Diamond Alkali Company, Painesville, Ohio, since 1936, *C. S. Hancock* has been promoted to manager of calcium carbonate sales. Mr. Hancock joined Diamond at its Pittsburgh offices back in 1925. Shortly thereafter he was transferred to Painesville, Ohio, where he was advanced to the post of treasurer of the Pure Calcium Products Company, which later became incorporated into the Diamond organization in 1936.

APPLETON FELTS

forward in the march of progress

FOR INCREASING PRODUCTION OF GOOD PAPER . . . .

APPLETON WOOLEN MILLS

APPLETON · WISCONSIN

CHARLES GILLETT NAMED AFPI MANAGING DIRECTOR

The selection of Charles A. Gillett as managing director of the American Forest Products Industries, Inc., was announced last month. He succeeds Chapin Collins who will resume publication of newspapers he owns in the state of Washington after serving with the forestry organization since 1943.

Mr. Gillett has been the chief forester for the American Forest Products Industries, and previously was forester for the Seaboard Air Line Railway. He also served as Arkansas' first state forester, as extension forester in Arkansas, and North Dakota, and as assistant extension forester in New York State.

Chas. A. Gillett

The association he now heads is national sponsor of the American Tree Farm program, the "Keep America Green" movement for forest fire prevention, and other projects to encourage better management and protection of forest lands.

▼

W. VA. PULP & PAPER NAMES McCREARY NEW PLANT HEAD

Beginning his career with the company as a chemist 12 years ago, Melvin L. McCreary has been named manager of the Williamsburg (Pa.) plant of West Virginia Pulp and Paper Company. The appointment was made effetcive as of November 1.

In his new position he succeeds H. Drew Stroup, who recently resigned as plant manager after nearly five years of service in that capacity. He will continue with the company as a consultant.

Mr. McCreary became associated with the paper company shortly after his graduation from Juniata College, starting as a chemist in the fall of 1936. In 1937, he was named assistant superintendent of the pulp mill and in 1941 was promoted to chief chemist. In 1946, Mr. McCreary became technical assistant to the mill manager and in October of 1947 was named assistant mill manager.

Mr. McCreary is a member of the American Chemical Society and the Technical Association of the Pulp and Paper Industry.

▼

D. S. DAVIS LEAVES U. OF AKRON—NEW CONNECTION VIRGINIA POLYTECHNIC

The resignation of D. S. Davis, who has been technical editor at the government laboratories, University of Akron, in Ohio, has been announced. Mr. Davis has accepted a new position as professor of chemical engineering at the Virginia Polytechnic Institute, Blacksburg, Virginia.

For a number of years, Mr. Davis has been a frequent contributor to THE PAPER INDUSTRY AND PAPER WORLD.

▼

RICHARDS TAKES OVER NEW DUTIES AT BEWIN PAPER CO.

Beginning work as mill superintendent at the Bewin Paper Company specialty mill in Dansville, New York, Howard R. Richards, has resigned his position as assistant supervisor of the Crown-Zellerbach National Paper Products Company, Carthage, New York.

Mr. Richards has been employed as assistant supervisor of the mill for the past seven years. Previous to his employment there, he worked at the Scott Paper Company in Chester, Pennsylvania.

▼

▶▶▶ Effective January 1, *W. A. Redpath* has been appointed manager of the Philadelphia plant of Joseph T. Ryerson & Sons, Inc., Chicago, Illinois, succeeding C. L. Hardy. Mr. Hardy was recently elected assistant vice president of the Ryerson organization, with headquarters in Chicago.

▼

UNITED STATES RUBBER CO. EXECUTIVE CHANGES

President of United States Rubber Company, Herbert E. Smith, will become chairman of the board and chief executive officer of the company effective January 1, and vice president and chairman of the finance committee, Harry E. Humphreys, Jr., will become president and chairman of the executive committee.

Mr. Smith and Mr. Humphreys were elected at a meeting of the board of directors December 10, when F. B. Davis, Jr., chairman of the board and chief executive officer for 20 years, announced his retirement effective December 31. Mr. Davis will continue as a director and member of the finance committee.

▼

INTERNATIONAL PAPER CO. DISCONTINUES OFFICE OF CORPORATION CHAIRMAN

Following the meeting of directors, John H. Hinman, president of International Paper Company, announced that the office of chairman of the corporation has been discontinued.

This office has been vacant since the death of R. J. Cullen on November 13, 1948. It was created in 1943 when Mr. Hinman succeeded Mr. Cullen as president and Mr. Cullen became chairman.

▼

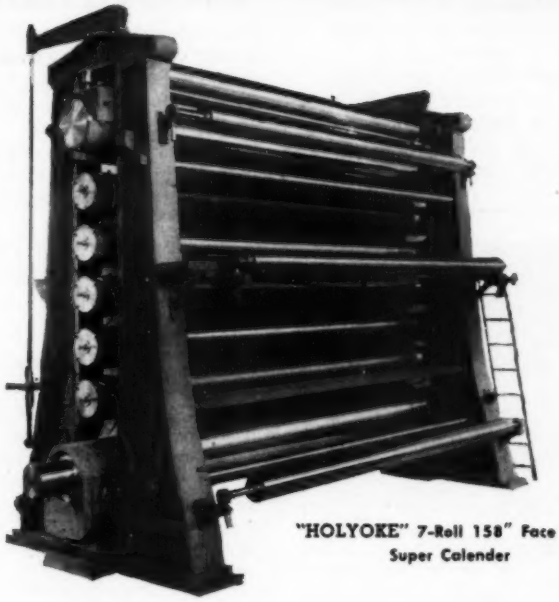
▶▶▶ In addition to becoming head of manufacturing operations at the Fontana, California, plant, *Thomas J. Lingle* will direct West coast sales of the Taylor Forge & Pipe Works, Chicago, Illinois. He was formerly associated with C. F. Braun Company, Alhambra, California, and since 1946 has operated his own valve and fittings business in Alhambra.

Thomas J. Lingle

▼

▶▶▶ Previously associated with the paper industry in four countries, *George H. Colson* has recently taken up new duties as superintendent of two paper mills of the Cia Anonimo Industrial Del Carton in Venezuela. Mr. Colson came to the American Writing Paper Corporation, Holyoke, Massachusetts, two years ago as superintend-

"HOLYOKE"



"HOLYOKE" 7-Roll 158" Face Web Super Calender

HOLYOKE MACHINE COMPANY
HOLYOKE
EST 1863
TRADE MARK

86 YEARS of LEADERSHIP with DISTINCTION

The HOLYOKE MACHINE COMPANY is the oldest manufacturer of Pulp and Paper Mill Machinery in Holyoke, — the Paper City.

"HOLYOKE" design, engineering, manufacturing, and service are backed by 86 years of world-wide experience. Take your problems to "HOLYOKE", — whether you are interested in new machinery or in modernizing your present equipment.

Super Calenders
Laminators
Paper and Cotton Calender Rolls
Rotogravure Printing Equipment
Turbine Water Wheels and Parts
Filter Equipment
Special Machinery

THERE IS NO SUBSTITUTE FOR EXPERIENCE

HOLYOKE MACHINE COMPANY

502 MAIN STREET HOLYOKE, MASSACHUSETTS

DESIGNERS AND BUILDERS OF PAPER, PULP, AND TEXTILE MACHINERY

ent of the Gill Division, after serving as specialties superintendent of the Pacific Mills. He had previously worked in paper mills in England and India.

▼

JOHNS-MANVILLE NAMES MARCHANT AS MANAGER OF NEW NATCHEZ PLANT

Assuming his new post at the beginning of this year, A. B. Marchant has been appointed manager of the new Johns-Manville insulating board plant at Natchez, Mississippi.

One of the youngest plant managers, Mr. Marchant joined the company in 1939. He began as a laboratory tester and time checker at the insulating board plant at Jarratt, Virginia, and three months later was promoted to the Industrial Engineering Department and trained in that field. He advanced rapidly through various grades to become superintendent of production, planning and scheduling at the Jarratt Plant, which post he vacates to become plant manager at Natchez.

Mr. Marchant received his formal education at the University of Richmond, where he took a Bachelor of Science degree in business administration, majoring in economics.

Balance is the essence of skill in ski-jumping.

Balance between finish, water-removal and durability is the acme of achievement in felt manufacture.

Based upon your specifications, Draper Felts are designed and made to secure a correct balance between the properties needed for your particular conditions.

The DRAPER Felt

DRAPER BROTHERS COMPANY

Woolen Manufacturers Since 1856

CANTON, MASSACHUSETTS

RALPH E. BRIGGS, *Sales Manager*

• BRADFORD WEST, *Pittsfield, Mass.* • WILLIAM N. CONNOR, *Jr., Canton, Mass.* • L. H. BREYFOGLE, *Kalamazoo, Mich.* •
• WALTER A. SALMONSON, 519-20 *White Bldg., Seattle, Wash.* • L. L. GRIFFITHS, *Jr., Kalamazoo, Mich.* •

NECROLOGY

JOHN HOWARD DRAPER

Vice president of Draper Brothers Company, Canton, Massachusetts, John Howard Draper passed away December 17 in Palm Beach, Florida, at the age of 65.

Mr. Draper had been associated with Draper Brothers Company for the past forty-five years. He was formerly treasurer of the company.

In addition to his widow, Mr. Draper is survived by two daughters and two sons.

▼

▶▶▶ Since 1945 president of the Appleton Coated Paper Company at Appleton, Wisconsin, *Fred Heinritz,* 54 years of age, passed away October 20. He was a past director of the Appleton Chamber of Commerce and served as secretary of the Appleton Fire and Police departments.

▼

FRED LEADBETTER

One of the organizers of the paper manufacturing plant at Camas, Washington, now part of Crown-Willamette Paper Company, Fred Leadbetter, Oregon pulp and lumber executive, passed away December 22 in Los Angeles at the age of 78.

Mr. Leadbetter was a member of the board of the Oregonian Publishing Company, president of the Columbia River Paper Company, Oregon Pulp & Paper Company, California-Oregon Paper Mills, Columbia River Paper Mills, and Leadbetter Lumber and Paper Company.

▼

DAN M. BECKETT

Secretary of the Beckett Paper Company, Hamilton, Ohio, Dan M. Beckett, 36 years of age, passed away December 3.

In 1933 he became identified with the company, which was founded 100 years ago by his grandfather, and later developed by his father.

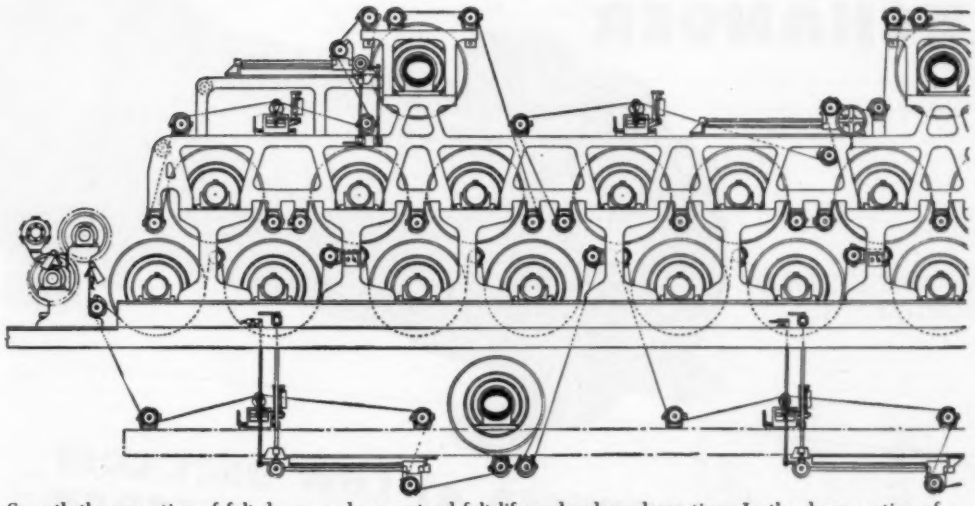
After serving an apprenticeship in various departments of the mill and office, he became connected with the sales department, was made a member of the board of directors, and later elected secretary of the company.

In recent years, his responsibilities included supervision of the company's sales promotion and advertising activities.

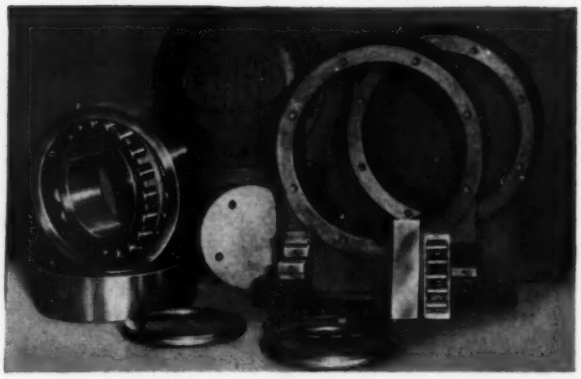
Torrington Spherical Roller Bearings Will

Extend Felt Life

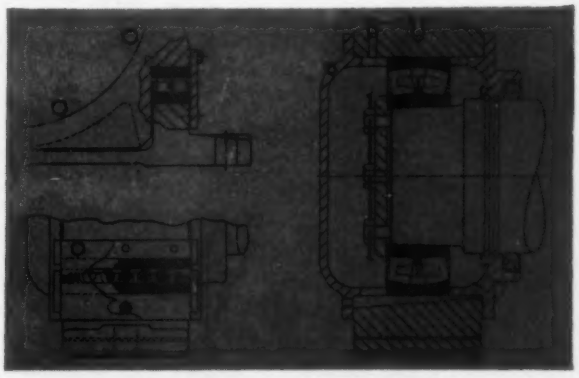
on Sandy Hill Paper Machines



Smooth the operation of felt dryers and you extend felt life and reduce down time. In the dryer section of a new paper machine, shown in the elevation drawing above, The Sandy Hill Iron & Brass Works gains these advantages with Torrington Spherical Roller Bearings and a unique Torrington tending side mounting. Proper alignment, vital if journals are to turn freely, becomes *automatically certain* with these *self-aligning* bearings.



Inspection and mounting of the bearings can proceed rapidly, thanks to the simplicity of the housing and the unit design of the bearings. Tapered journal and bearing bore make it easy to secure proper internal running clearances by controlling the amount of expansion given the inner race.



Expansion and contraction of the felt dryers are accommodated by the tending side mounting shown here in cross-section. This Torrington design incorporates two ladder type bearings that allow free axial movement. This mounting, together with the self-aligning bearings, results in lower roll friction and reduces felt wear.

Where heavy loads and shaft deflection are problems, you can improve operation and minimize maintenance with Torrington Self-Aligning Spherical Roller Bearings. Our engineers, skilled in solving routine and unusual friction problems, will gladly work with you on your requirements. Write us today. THE TORRINGTON COMPANY, South Bend 21, Ind., Torrington, Conn., District Offices and Distributors in Principal Cities.

TORRINGTON *SPHERICAL ROLLER* **BEARINGS**

Spherical Roller • Tapered Roller • Straight Roller

Needle • Ball • Needle Rollers

THE WORLD'S *Most Versatile* EXCHANGER

NOW MASS-PRODUCED AT LOW UNIT COST AND CONTINUALLY CARRIED IN STOCK

● It didn't happen overnight. More than 150,000 Ross "BCF" Exchangers, placed into service during the past few years, *set the pattern.*

For, with such a large number of units doing a cooling, heating or condensing job in practically every type of industry, Ross was able to make thoroughly conclusive observations. A definite trend became apparent in the selection of individual assemblies from standardized "BCF" parts. Thirteen sizes and sets of dimensions clearly established themselves as the needs of the majority, as did certain refinements in construction and advancements in thermal engineering gained through practical observations in the field.

Thus, with the will of the majority expressed, these most-wanted features have become standardized in the *new "BCF" All-Nonferrous Exchanger, now mass-produced for low unit cost, and continually stocked at the Ross plant for prompt shipment.*

So whether you're a builder of primary equipment, furnishing exchangers with your units as original accessories, or whether you're an actual user of heat transfer equipment, you can be sure of more BTUs transferred per dollar invested with a mass-produced "BCF" than with any other exchanger.

★ NEW BOOKLET—*FREE*
Eight pages illustrate and summarize your benefits from the new "BCF". Ask for Bulletin 1.1K1 on your letterhead.

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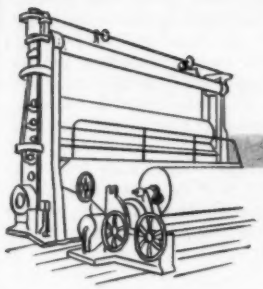
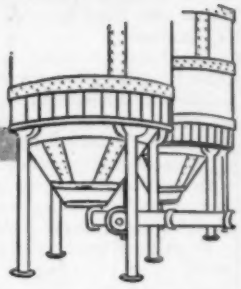
Serving home and industry



Practical SHORTS



Readers are invited to submit short, practical articles for this department. The items should be original and should relate to ways and means of handling production and maintenance jobs. Where possible, articles should be illustrated. Rough sketches only are required. Payment will be made for acceptable items upon publication.

Are You Familiar With the "Steam Loop"?

How does it eliminate a steam return trap? Here is a letter that came in to the writer for reply not so long ago:

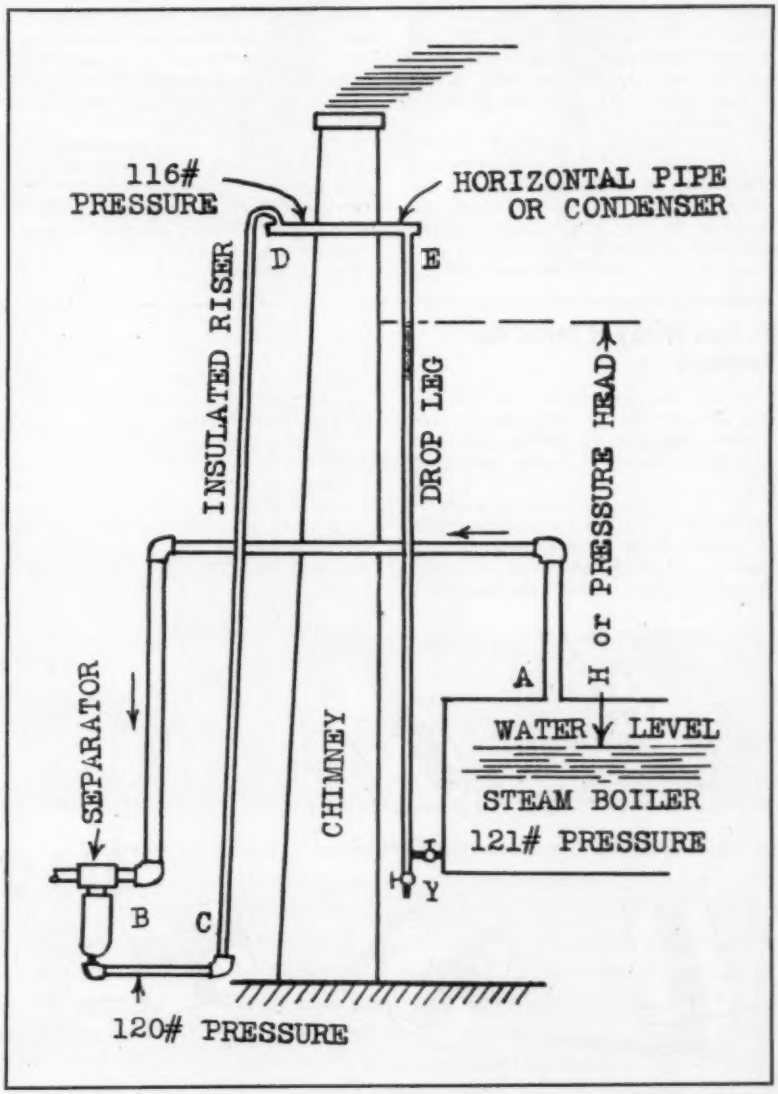
"Can you advise me where I may obtain information about installing what is known as a "steam loop"—a system of piping by which water of condensation in steam pipes is automatically returned to the boiler without resorting to the use of a steam return trap? In its simplest form the system consists of three pipes which are called the riser, the horizontal, and the drop-leg. The riser empties at a suitable height into the horizontal, and from there the water of condensation is led into the drop-leg which is connected to the boiler. The water in the drop-leg is fed into the boiler as soon as the hydrostatic pressure in the drop-leg, plus the steam pressure in the pipes is sufficient to overcome the boiler pressure. I ran across this brief description of a "steam loop" in a text book in England, but have never seen further reference to it elsewhere, and I am much interested to learn what practical application it might have at our plant and what its limitations are."

Many plant operators are of the opinion that high pressure steam drips can be returned to the boiler only by means of the steam trap, pump, or injector. That, however, is not true, as the writer of the above letter is aware.

The accompanying rough sketch shows a device that is known as a "steam loop" by means of which it is possible to return condensate or drips to the boiler without a steam trap, injector, pump, or any other means. This method is entirely automatic after it is once started, the principle of operation being somewhat similar to the well known sight-feed lubricator so commonly used on steam engines.

In order to show how the steam loop operates, let us follow a "drop of steam" leaving the boiler at point "A." That is, the amount of steam will be just enough to make one drop of water, or condensate. It goes upward into the steam pipe and by the time it arrives at point "B" it is condensed into water owing to inadequate insulation. The separator removes the drop from the steam and the drop falls into the lower chamber of the separator.

The pressure in the boiler is 121 pounds per sq. in., as stated on the sketch. On account of pipe friction the pressure at the separator is one pound less, or 120 lb. per sq. in. The next problem is to make the drop of water move upward through the steam riser "C," which it does readily, because there is a partial vacuum in the horizontal pipe "D" shown at the top. As shown, the pressure in this horizontal pipe is only 116 lb. psi or 4 pounds less than in the separator. The mixture of steam and our drop of water is therefore whisked upward through "C" into the horizontal pipe "D," where the conveying steam itself condenses into water and then falls with our "drop of water" into the drop-leg "E" at the right. This drop-leg is built to sufficient height so that the pressure of the water in the drop-leg plus the 116 lb. psi pressure at the top is sufficient to force the water back into the boiler.



It is a simple matter to determine the necessary pressure head "H" because each foot of water head creates a pressure of 0.434 lb. per sq. in. Inasmuch as the steam pressure at the top of the loop is 116 lb. and the pressure in the boiler is 121 pounds, there is a difference of 5 pounds psi, which means that the pressure head "H" must be at least 5 divided by the pressure at the top of the loop should drop to 110 pounds or

thereabouts, the height of the drop-leg would very likely be made 20 or 25 feet, or even more.

The chimney is shown in this sketch because in actual plant practice chimneys are usually the highest structures, consequently are sometimes used as supports for holding the loop at the necessary height. Sometimes a cupola or small structure is built on top of the roof for housing the necessary piping. And again the building itself may be tall enough without anything additional.

To start the loop in operation the operator merely opens the valve "Y" until steam is emitted from that valve, which means, of course, that the entire loop is filled with steam. Then upon closing valve "Y" the steam in the horizontal pipe at the top begins condensing and falling into the drop-leg "E" until the pressure head "H" is built up sufficiently high to force the water into the boiler.

It is considered good practice to insulate the riser pipe "C," thereby reducing the total amount of condensate, but that is not always necessary. Much depends upon the height of the loop, the price of fuel, the amount of condensate to be cared for, etc. There is such a thing in some cases as "spending too much," even for insulation.

This simple system can be and sometimes is expanded considerably. Thus instead of the small steam separator located at "B," a larger vessel called a "receiver" is placed at a point in the building sufficiently low so that all drips from any point in the plant can drain into it. The larger quantity of condensate in this receiver permits a more uniform regulation—uniform steam and water velocity—in about the same way that a boiler feed pump can be set to operate continuously for a given load. At the top of the loop, in place of the horizontal pipe "D," a "Discharge Chamber" is used of sufficient volume to take care of all condensate. This discharge chamber is in turn piped to a feed water heater through a reducing valve. In this way the desired low pressure is obtained at the top of the loop. In other words, the low pressure in the feed water heater will reluce the pressure in the discharge chamber down to whatever pressure the operator may desire by simply adjusting the reducing valve. After once being "set," the operation is entirely automatic. This somewhat more complicated system of automatic drainage is known as the "Holly Loop."—W. F. SCHAPHORST, M. E.

To Seal Wrapped Parcel Post Packages

In half the usual time—with just one strip of tape—you can get a strong, neat, seamless package by the sealing method that is standard practice in leading mail order houses:

Lay merchandise on wrapping paper so that the far edge can be centered along top of package, using left hand for centering, Figure 1. Fold the paper-end which lies toward you over or around the bundle and then pull far edge up tightly. Seam of wrapping paper is automatically centered lengthwise at top of package.

Hold paper in place with one hand. With the other hand, dispense tape-strip. Length of tape-strip should be 6 in more than the width of your wrapping paper roll. Grasp tape-strip at end closest to machine and draw it over package. Steady the strip between index and third fingers of hand holding package until strip is centered exactly over seam, Figure 2. Press down, rubbing from center out.

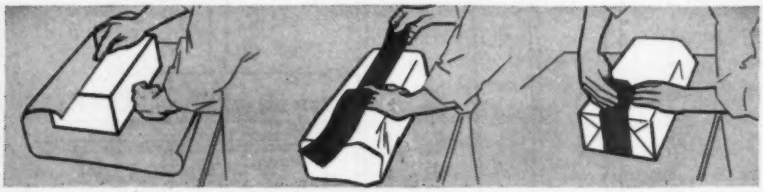


Figure 1 Figure 2 Figure 3

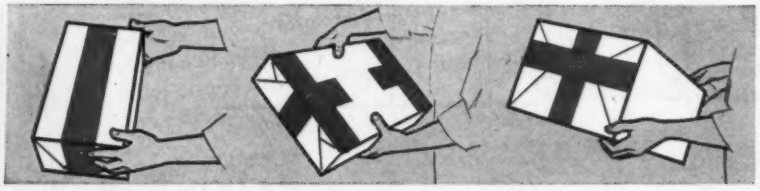


Figure 4 Figure 5 Figure 6

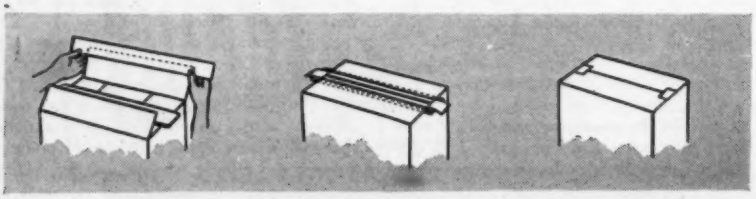


Figure 7 Figure 8 Figure 9

Turn package over so that the gummed side of the tape faces up and doesn't stick to the table or merchandise. Fold in flaps on far end, pull up moistened tape and seal this end, Figure 3. Holding sealed end against body, fold other end-flaps, draw up remaining tape-end tightly and complete sealing, Figure 4.

If the package is unusually wide and shallow, apply tape crosswise and anchor end flaps, Figure 5. If the package is deep, the edges of the end folds should be sealed closed, Figure 6.

To Apply a Pilferage-Prevention Seal

This seal can be applied to cartons where outside flaps meet at the center. This under-the-flap seal prevents pilferage because tape cannot be soaked off without obviously damaging carton.

Place a strip of 3/8 in. plywood, 3 in. wide and longer than carton, lengthwise underneath center seam. Dispense a strip of tape, long enough to extend about 3 in. beyond carton at each end, apply half of width to underside of farther flap, Figure 7. Bring taped flap down against plywood strip. Then press nearer flap down on the exposed half of moistened tape-strip, and rub down, Figure 8.

Turn up ends of tape-strip and seal on top of flaps, Figure 9.

Slide out plywood strip and complete sealing carton. (Described under "To Seal Slotted Cartons," P.I. & P.W., November, 1948, page 1238.)—From *Gummed Tape User's Handbook*, published BY BETTER PACKAGES, INC.

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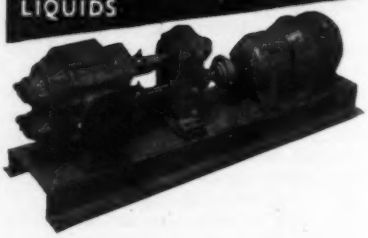

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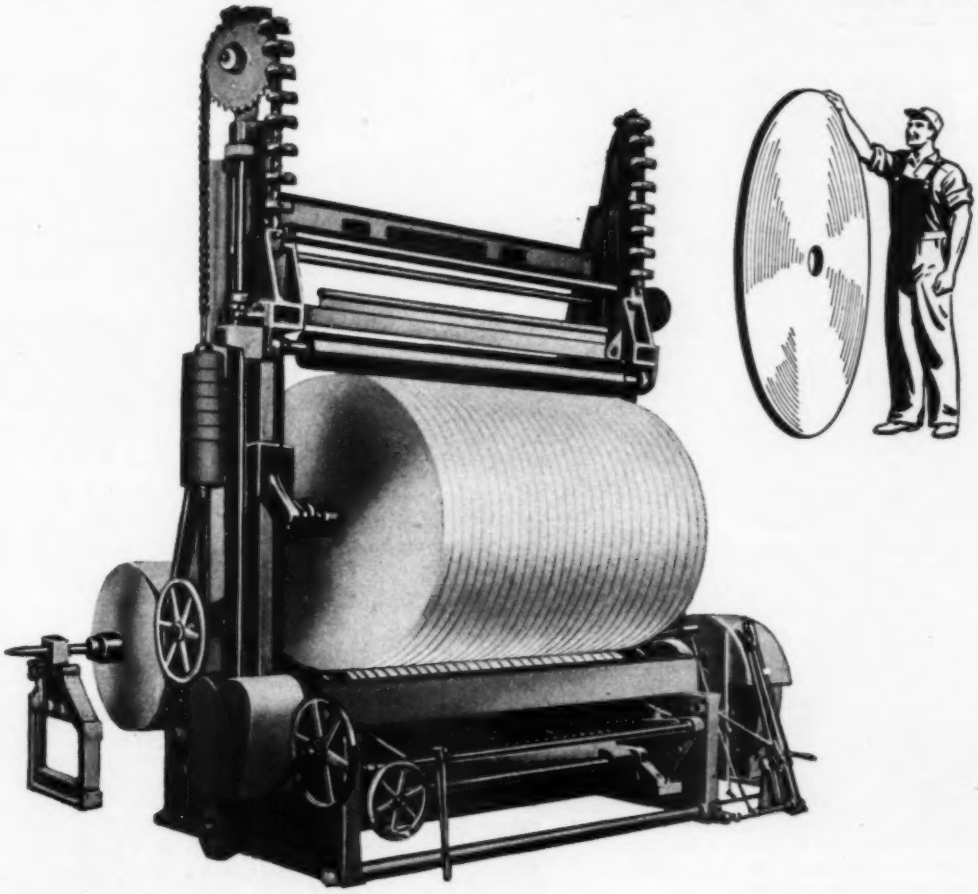

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Why Size Paper?*

WILLIAM S. WILSON
Monsanto Chemical Co.
(Everett, Mass.)

Many paper chemists have been asked why they sized paper. Except for writing paper a satisfactory answer to that simple question hasn't been given. Furthermore, some of the answers revealed rather surprising misinformation regarding the mechanism of paper's protective action against water and also as to the meaning of some of the standard tests. After studying the theory of engine sizing for a number of years, we know how it changes some properties of paper.

Engine sizing imparts two major properties to paper, namely, coagulating power or substantivity to negative colloids and an almost complete waterproofing of the exterior surfaces of the fibers if the process is carried to the ultimate. Apparently it has no effect on the water absorbing characteristics of the interior of the fibers.

Paper itself is a coagulum of cation exchangers or negative colloids (pulp, rosin, clay, starch, dyes, etc.), held together with aluminum bonds or aluminum ions, if you like to look at it that way. There is always room for one more in a coagulum so the sized paper fibers possess the ability to grab, and hold to their outside surfaces, the ink dye particles present in writing ink. When the ink dye particles are coagulated with or fastened to the fibers, the remaining clear ink liquid is free to act as near like water as its composition will permit. In other words, in an ink penetration test, the liquid goes through the paper somewhat faster than water does but it leaves the ink dye particles behind fastened to the pulp fibers.

A hard sized sheet may be able to bind to itself ink dye particles equivalent to ten or more times its liquid holding capacity. That is, to get the ink dye to the top surface where we can see it as an end point, we may have to completely fill the sheet with ink at least ten times over. Because a capillary has no lifting power after it is full, the only way we can get ten volumes of ink through one volume of paper is to evaporate nine volumes of ink off the top of the sheet. The ink penetration test is then dependent upon the rate of evaporation and coagulating power and has nothing to do with the rate at which water is drawn into the sheet.

The above is very easily proved by covering the paper with a watchglass to slow the rate of evaporation. This greatly retards the end point just as raising the temperature, or increasing the rate of evaporation speed up the test. If a hard sized ink penetration boat is covered with powdered sugar and then floated on ink, the sugar may be nearly completely dissolved to a water-white solution for several minutes before the ink color shows up at the top surface.

Figure 1 shows water and ink penetrations on a series of sheets containing increasing amounts of rosin. Alum is constant over the whole range. The same type of curves would be obtained if rosin were held constant and alum increased. If the series represented increased sheet thickness with constant sizing, the curves would also be somewhat of the same type, although, in this case, the water penetration curve would not flatten out. The differences between these two curves largely represent the amount of water which has to be evaporated or the amount of ink dye particles which are required to satisfy the coagulating power of the particular sheet.

As sizing is a process of coagulation, the coagulating power of the sheet is an excellent relative measure of the efficiency of the sizing process. Thus, relative ink penetrations are an excellent measure of relative sizing but the numerical values are meaningless as far as rate of penetration is concerned. Any one who believes a two hour ink penetration means it takes two hours for water or ink liquid to get through the sheet is way off the beam.

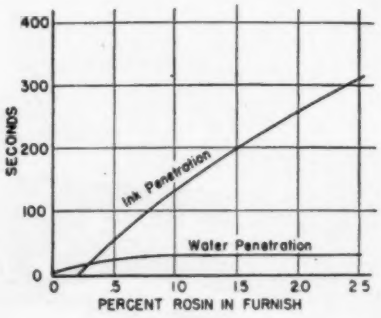

Figure 1

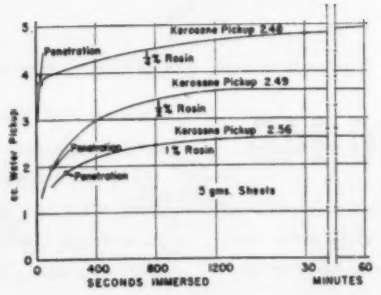

Figure 2

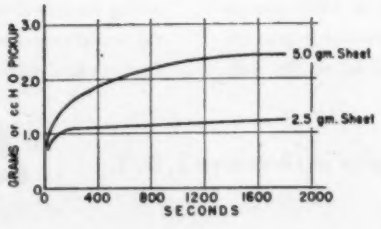

Figure 3

Just notice that the water penetration test increases quite fast on the low rosin dosage end and then flattens out. The rapidly rising part of the curve represents the easy job of making the exterior surfaces of the fibers hydrophobic or plugging the interfiber capillaries with air. Once this is practically complete, the water has to go entirely through the fibers. As sizing has no effect on the interior of the fibers, the curve naturally flattens out. The ink penetration curve keeps rising because we can continue to increase the coagulating power long after no significant increase in waterproofing the exterior of the fibers is possible. Rosin particles can grab ink dye as readily as can pulp fibers. We can keep on adding to the rosin content of the sheet long after we have enough rosin to make the fibers practically hydrophobic.

A sized sheet of paper will float on water indefinitely. Since cellulose has a specific gravity of 1.56, the sheet must be kept afloat by rather large amounts of entrained air. This air is really tied into the sheet because it will stay there for days even when the sheet is held under water. That the air is still there can be shown by introducing a wetting agent into the water, whereupon the sheet will begin to effervesce. This air that refuses to be displaced by water increases as we increase engine sizing. The increase is very rapid as we increase sizing in the range covered by the term *slack*. When we get into the hard sized range the irreplaceable air increases slowly and, finally, approaches a maximum or constant amount for the sheet in question. This maximum amount of irreplaceable air naturally varies with the type of pulp and the amount of beating.

It is much more convenient to measure the amount of water that can't get in than to measure the amount of air that can't get out of the sheet. There is a secondary benefit to be gained by this method. As we increase sizing, the amount of water that can get in approaches a minimum that seemingly cannot be exceeded. This minimum can be increased by increased beating. The increase is rather small, however, and the very rough constancy of this minimum between different pulps leads to the suspicion that it is a function of the amount of cellulose present but modified by the water holding ability of such fibers as are too small to be sized by the relatively large rosin particles. Another way of saying the same thing follows. This minimum water pickup consists of two parts. A relatively small amount of water drawn in by fibers so small that rosin particles can't stick to them. A relatively large amount which depends upon the water imbibing ability of the cellulose lattice itself.

This line of reasoning, if correct, would imply that we can make the exterior of the pulp fibers completely hydrophobic by engine sizing but that we cannot in the least affect the water imbibing properties of the fibers themselves. If only the cellulose molecules themselves are unaffected, then

*Abridgment of paper presented at the Kalamazoo Valley Section of TAPPI, October 7, 1948.

132" x 80' wire,
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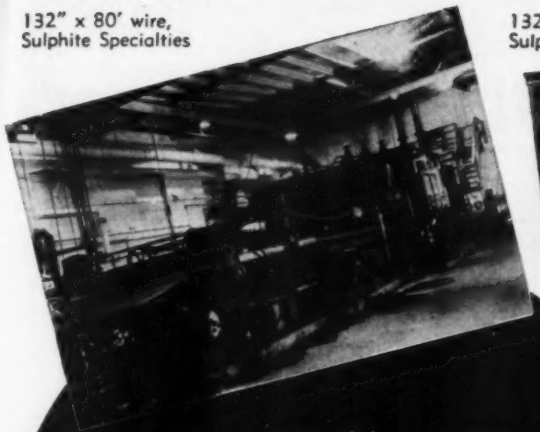

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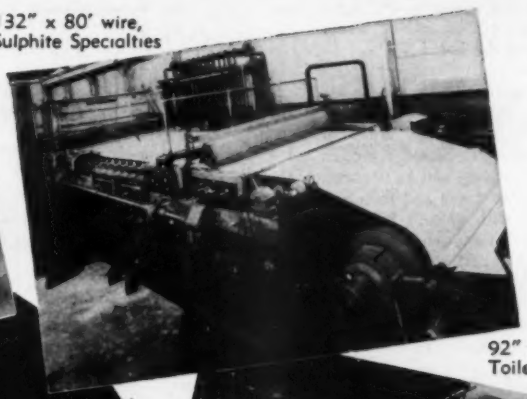

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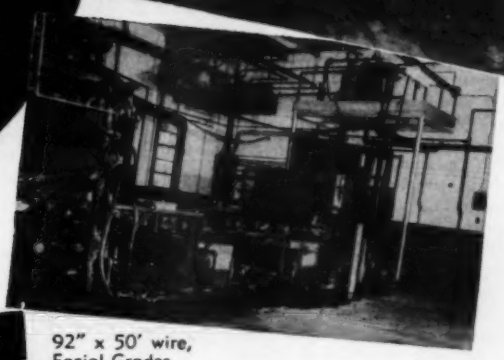

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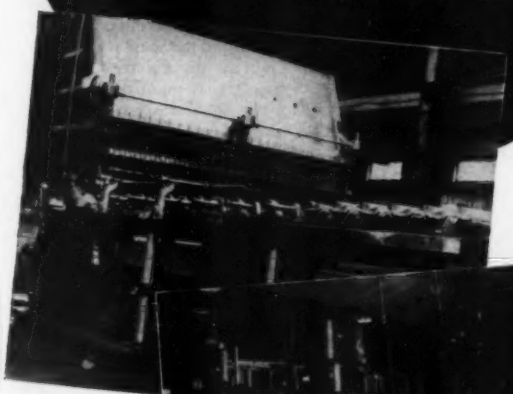

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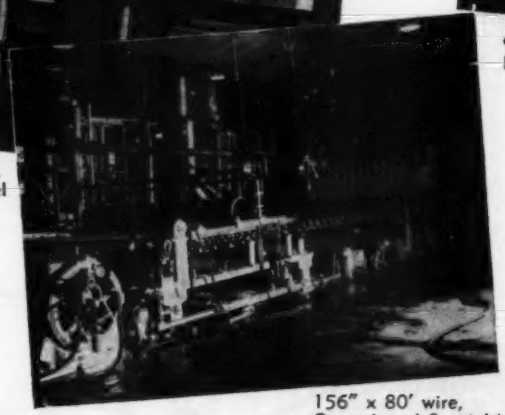

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the natural cavities and canals of the fibers are made as hydrophobic by engine sizing as are the exteriors of the fibers.

If rosin and alum can make the exterior of the fibers hydrophobic, they should do the same to the interior of the fibers, provided we can get them inside. We have tried to get molecularly dispersed rosin, in the form of sodium rosinate and as alcoholic rosin solutions into the fibers and then precipitate them there with alum. We have taken all foreseeable precautions to prevent premature precipitation of the rosin by acids or water in the fibers. We have not been able to make any dent in the equilibrium water pickup minimum by this technique. One would scarcely expect even a rosin molecule to get inside the cellulose lattice but the fiber cavities and canals should be permeable to such molecules. So far the evidence favors the assumption that the equilibrium water pickup minimum represents the water imbibing ability of the cellulose lattice.

I have been very careful to say that these maxima and minima are only approached. That is, there may be some fibers, probably fibrils, which are not hydrophobic and therefore carry small amounts of water in the sheet. However, there seems little doubt that a well sized sheet, even after long soaking, consists of water-saturated cellulose fibers which are surrounded by air which completely fills the inter fiber capillaries. In plain English, engine sizing can do nothing to a sheet of paper except keep air instead of water in contact with the exterior surfaces of the fibers.

This doesn't sound like much, but interfiber capillaries, which insist on staying full of air, just don't transmit water and at least one type of sheet bond, if kept dry by an air overcoat, doesn't lose strength as fast as it would if wet. In other words, engine sizing plugs the interfiber holes with air so that water can't get through. If carried to the ultimate, what water gets through must go through the fibers. By keeping the fiber to fiber contacts dry, it greatly increases wet strength. Except for coagulating power these are the only properties imparted to paper by engine sizing as far as I know.

If engine sizing consists of making the air between the fibers irreplaceable and this results in a decrease in the rate of translation of water and an increase in wet strength, we have three possible means of determining water resistance:

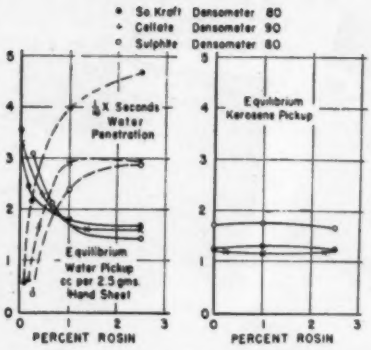

Figure 4

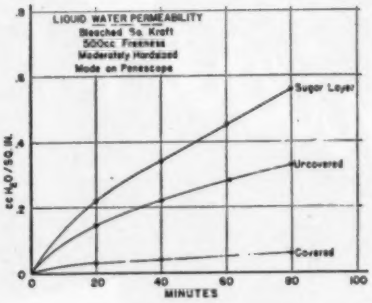

Figure 5

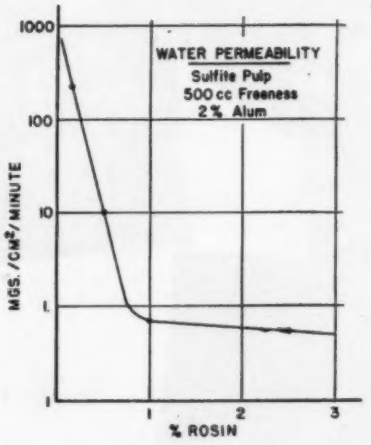

Figure 6

I. Measure the amount of air which can't be driven out of the sheet by long submergence in water.

II. Measure the rate at which water passes through the sheet under some standard driving force. This can be pressure or suction.

III. Measure the rate at which the dry strength of the sheet disappears on submergence.

Measuring the amount of air that water can't drive out of a sheet of paper isn't easy. It can be done by sticking the lower end of a hydrometer through a sheet of paper and floating the whole assembly in a large museum jar. Since cellulose has a specific gravity of 1.56, its negative buoyancy should pull the hydrometer down unless there is a large percentage of retained air. Actually, there is a positive buoyancy and this permits calculation of the amount of irreplaceable air. The calculation is complicated and involves other measurements. There is danger of trapped air bubbles in folds of the paper and the results are subject to the solubility of air in the water used.

Direct weighing of the amount of water picked up is much easier and much more informative and useful in our opinion. Figure 2 shows the amount of water picked up at any given time for three different degrees of sizing. On each curve there is an arrow which indicates the water penetration time (sugar dye) on the same sheets. First notice, that at the water penetration end points there are entirely different amounts of water in each sheet. That is, the same water penetration end point means different amounts of water on different sheets of paper.

Next notice that the ratio of water picked up to sheet weight varies greatly between the three sheets as we increase the time. The three sheets show the same differences in this ratio only after a long immersion. In other words, the water pickup is useful as a relative measure of sizing only at equilibrium water pickup. Actually, there is no absolute equilibrium, but at the end of an hour on ordinary thicknesses, the rate of absorption has slowed down to what could be called practical equilibrium.

Figure 3 shows water pickup plotted against time for two sheet thicknesses made from the same furnish. Again we see the ratio of water picked up to sheet weight varying between the two sheets with time. However, they are approaching a time when

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the 5 gm sheet will have picked up just twice as much water as the 2.5 gm sheet. That is, the per centage increase in weight will be the same for both sheets. It should be the same for both sheets because they were made from the same furnish. As far as I know, this equilibrium water pickup test is the only method of determining sizing which is independent of sheet thickness. From these data one sees that a Cobb test (less than equilibrium time) will indicate poorer sizing on the thicker sheet—which of course isn't so. This isn't criticism of the Cobb test which isn't supposed to compare sheets of different thicknesses. It merely points out that thickness affects the Cobb test in a manner opposite to other tests. Other tests would just as incorrectly indicate better instead of worse sizing on the thicker sheet.

If water advanced through paper on a straight and uniform front it wouldn't know of the extra free energy ahead of it in the thicker sheet. It is the scouting feelers of an irregular front which add to the energy available for drawing water into the sheet. The thicker the sheet the more room for these scouting feelers and, therefore, the more energy that can be utilized at any given instant. The experiment then, not only shows that the per centage equilibrium water pickup is independent of sheet thickness but also that water penetrates a sheet along a very irregular front.

I suspect the equilibrium water pickup test to be the best test available for measuring sizing. We have shown it to be the only test that is independent of thickness. If we are correct in assuming that the aforementioned minimum value is largely dependent upon the cellulose lattice itself, then the test should also be more or less independent of the type of pulp.

Figure 4 shows some equilibrium water pickup tests and corresponding water penetration tests. The two types of curves, although inverted, are of the same general type. However, the numerical values of the water penetration test haven't the general significance of the water pickups. The former can be all over the lot depending upon kind of pulp, beating, etc. They apply only to the one sheet in question and they mean only that, at that particular time, interval water will appear at the inside of the package and begin damage to the contents. They tell nothing of how much water has arrived, how much will continue to arrive, nor how fast the strength of the sheet will deteriorate when wet.

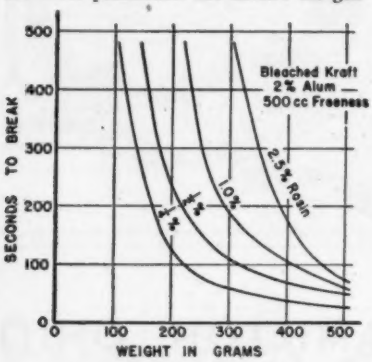

Figure 7

The second suggested method of determining sizing, namely finding how fast water could be pushed through the sheet was tried out as follows. By means of a penescope, we put 15 in. of water head on the paper which was all 2.5 gm hand sheets would stand for a half hour. At the end of that time, a magnifying glass showed up a few very tiny protuberances of water, presumably at tiny pinholes on a hard sized sulphite sheet. There were none on a corresponding bleached kraft sheet. This didn't look as if one would get anywhere measuring the amount of water pushed through by any pressure the sheet would stand.

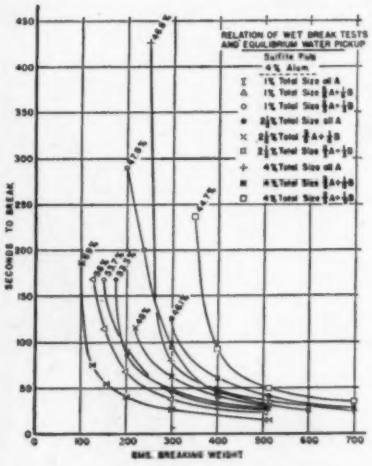

Figure 8

By watching the fall of water in the manometer attached to the penescope, it became apparent that water under a seven-in. starting head was passing through, but only as fast as it evaporated. By covering the penescope opening with a watchglass, the rate of losing water was very materially cut. Powdered sugar was next put into the recess at the opening whereupon the rate took a good sized jump. The three rates just mentioned are plotted on Figure 5. Obviously, the sugar was taking care of the water much faster than was evaporation and we were measuring the rate at which water was being removed rather than the permeability of the sheet. If the permeability of the sheet depends upon how fast the water is taken away from the other side, then the contents of a bag are much more important than any sizing test in determining how fast the water gets through. As this is a hard sized sheet, it would look as if no paper would be useful in packaging materials of high capillary activity unless a supplementary moisture-proof barrier was built in. I believe this is customary.

In order to get the sugar on top of the paper to be tested, the penescope has to be operated so the paper is horizontal. This means that there is some air left under the paper at the start of the experiment. This must be allowed to work out before the rate data is taken. We plotted curves of volume of material passed against time. The initial rush of water into the sheet and air through the sheet, gave a curve which soon changed into a practically straight line. The rates reported are calculated from the slopes of these straight lines.

Figure 6 shows how the permeability i influenced by the amount of size used. A curves were made with a seven-inch startin, head on the penescope and the recesse closure ring full of powdered sugar. Actually, the head is of little or no significance compared to the capillary and possibly osmotic pull of the sugar. At small rosin dosages a slight increase in rosin makes a big decrease in permeability. At higher rosin dosages even a large increase in rosin makes a small difference in permeability. This curve is so similar to the equilibrium water pickup plotted against the amount of rosin used, that one suspects they are dependent phenomena. In other words, the decrease in permeability follows exactly the increase in irreplaceable air which is plugging or air binding the interfiber capillaries. Once the capillaries are practically full of air the permeability depends upon translation through the fibers themselves. As engine sizing is ineffective on the interior of the fibers, both the permeability and the equilibrium water pickup remain constant.

The word constant is applicable only when the capillary pull is constant. For example, a good bag full of paraffin lumps might be submerged for hours with no water entering the bag. The same bag filled with powdered sugar and set in a shallow puddle might absorb the entire puddle in a comparatively short time. All in all, I suspect the papermaker goes through the sizing operation more to increase wet strength than to decrease the liquid water permeability. This is the most time-consuming and least satisfactory of the three proposed methods.

Measuring the rate at which immersion causes dry strength to disappear is quite simple. We attached weights to the ends of standard 1.5 cm strips, submerged the whole thing and recorded the time necessary for the given weight to break the strip. By using several different weights on each kind of paper we were able to plot curves showing the time necessary for any given weight to break the submerged strip. Figure 7 shows how the test shows up differe.. amounts of rosin when pulp and alum are held constant. Remember, that accordir.. to the water penetration test, there was little or no advantage to be gained by going over 1% rosin. Obviously, the wet strength

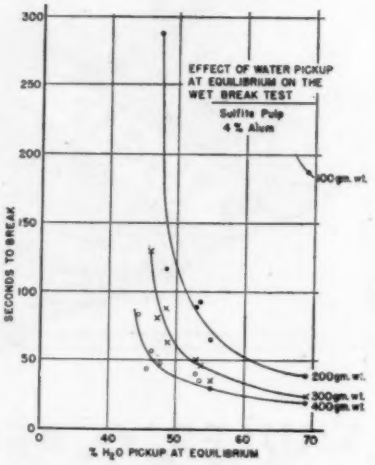

Figure 9

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Fig. 1893—Flanged end Gate Valve designed and developed especially for Paper Mill service. Body, bonnet and yoke are cast of 3% Nickel Iron; screwed-in seat rings are of 18-8 SMo; solid wedge is made of Ni-resist.

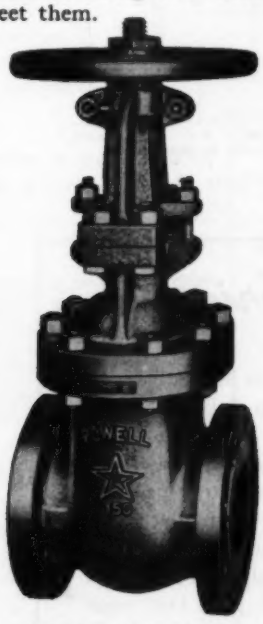

Fig. 1503—Class 150-pound Cast Steel Gate Valve with flanged ends, bolted flanged yoke, outside screw rising stem, tapered solid wedge.

Fig. 3031—Class 300-pound Cast Steel Globe Valve. Has flanged ends, bolted flanged yoke and outside screw rising stem.

Fig. 1259.—125-pound All Iron Swing Check Valve with flanged ends, bolted flanged cap and regrindable, renewable iron disc.

Fig. 375—200-pound Bronze Gate Valve. Screwed ends, union bonnet, inside screw rising stem and renewable "Powellium" wear-resisting nickel-bronze disc.

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can be materially improved by going to 2.5% rosin, and there is no indication that this is the limit. Experience indicates that we are actually limited only by the factors which lim it aluminum ion concentration.

As we have gone along, we have pointed out several possible points of disagreement between ink and water penetrations and the Cobb test. Let us see how these three suggested tests agree among themselves. First, let us compare the equilibrium water pickups with the wet break test.

Nine sets of sheets were made from the same pulp. Alum was held constant on all sets, but the amount of size was varied. The variations consisted not only of different amounts of size but also mixtures of two different sizes. That is, 1, 2.5 and 4% total size was used and each amount of size was varied from 100% A to ⅔ A plus ⅓ B and with an intermediate mixture of ⅚ A and ⅙ B.

The wet break curves for each of the nine sets of sheets is shown on Figure 8. On each curve is a figure which is the per cent equilibrium water pickup for that particular type of sheet. Note that there is nearly perfect correlation between the equilibrium water pickup and the position of the wet break curve. There are two pairs of curves which are nearly identical and a couple of points on these curves are out of place, apparently because of accuracy limitations.

Before the water pickup figures were put on the curves, there was no apparent rhyme nor reason to the order in which the curves were placed. For example, the curves with 47.8 and 46.8% water pickup were made with 4% of size A and with 2½% of total size made up of ⅔ A and ⅓ B. The 53.7 and 53.3% water pickup curves were made with 2½% A and with only 1% total size made up of ⅔ A and ⅓ B. Thus, 4% straight size is equivalent to 2½% of the mixture in one case and 2½% of straight size equivalent to 1% of the mixture in the other case. The data on this figure seems to give convincing proof that the equilibrium water pickup test and the wet break test tell almost identical stories and presumably are dependent phenomena.

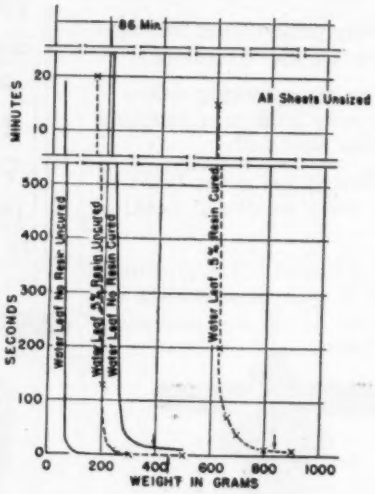

Figure 10

Figure 9 is made from the same data except the wet break time is now plotted against equilibrium water pickup. Remember, these times are a long way from the time necessary to attain equilibrium and that each point is a different distance from equilibrium. This may account for some of the scattering of the points. However, it is quite evident that this test is extraordinarily sensitive at low water pickups or hard sizing, which is just opposite to the water penetration and the water permeability tests. In other words, wet strength or maintenance of dry strength is much more dependent upon hard sizing than is water permeability or the water penetration test. The wet break test is very much more sensitive to this type of sizing than any other test.

It seems likely that there are some valuable leads as to what makes pulp fibers stay together is the fact that as we increase rosin the wet break test keeps rising while the permeability and water penetration tests flatten out.

One is naturally interested in how engine sizing wet strength compares with that from wet strength resins. The only data we have so far is for 5% of what we understand to be the best commercial wet strength resin. The amount used was a pure shot in the dark. On Figure 10 there are four curves but only two kinds of paper. Neither type of paper contains size or alum. The solid line at the left contains no resin. The dashed line at the left contains .5% of the wet strength resin. As we expected, the wet strength resin has moved the line to the right. The other two lines are the same two papers cured four hours at 105C. This curing was done simply because we understand this is customary practice in testing wet strength resins.

Obviously curing does something besides curing the resin because the cured paper, containing no resin, has more wet strength than the uncured paper that does contain resin. Naturally, this applies only to the use of .5% resin. I suspect that this is a case of irreversible dehydration of the fibers. They are thus made less hydrophylic or more water resistant. Heating a waterleaf sheet greatly increases the contact angle of a drop of water placed on its surface.

At the bottom of the figure are four arrows. These represent the wet tensiles for each type of sheet, made according to the standard TAPPI method except the soaking time was one hour. The difference between these arrows and the vertical part of the corresponding curve, which we think represents real wet strength, is rather surprising. Using the dashed right hand line as an example, we must conclude that after soaking an hour the strip will not break with an 830 gm wt. by the standard method, while on the wet break test 830 gm would break the strip after about 12 seconds immersion.

Figure 11 is the same type of data except that now all sheets are engine sized (2.5% resin, 3.0% alum). We see exactly the same results as before. Heating produces the same effect as wet strength because no resin cured is as good as .5% resin uncured. The wet tensile figures, as shown by the arrows, are in the same relative position to the nearly vertical parts of

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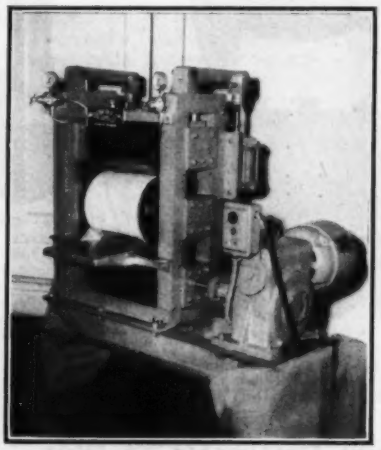

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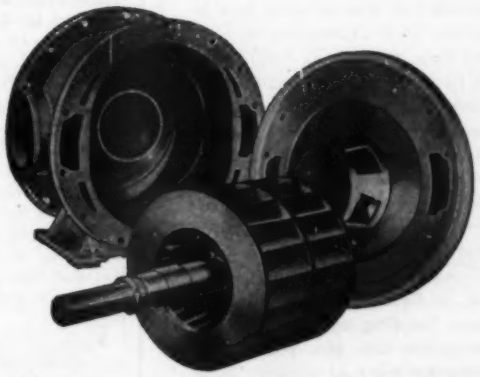

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the curve. Again an hour's soaking reduces the wet tensils to 1400 gm according to the standard method but only 25 seconds soaking is required to reduce the wet break test to 1400 gm.

The wet break test is obviously a more severe test than the wet tensile test. The difference is undoubtedly due to the fact that strain is as important as stress in determining the break. In the wet break test the strain, due to the breaking stress, is going on through the entire soaking period. In the wet tensile there is no stress and therefore no strain during the soaking period. The strain due to the final breaking stress occurs only during a very short time interval. The wet break test seems the more practical test as one is generally more interested in whether a full bag (under stress) will break when wetted, rather than whether an unstrained wet bag will stand filling. Of course there are other uses for paper (maps for example) where wetting precedes the stress.

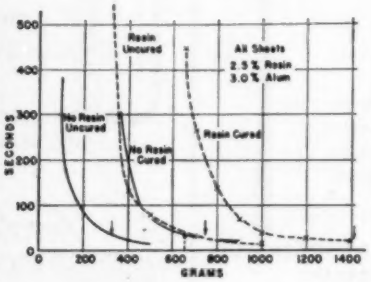

Figure 11

This heating of paper furnishes an excellent example of the different properties measured by different sizing tests. Dehydration lowers the dry tensile strength but increases the wet strength (10 seconds to over 30 minutes on the wet break test in one case of long heating), because the sheet has become more waterproof. This waterproofness was attained without aluminum ions and therefore with no increase in coagulating power. As a result, there was no increase in the ink penetration test. Thus, we have simultaneously a decrease in dry tensile and an increase in wet tensile. At the same time there is an increase in water penetration and a decrease in ink penetration.

Rosin is not, in itself, a good waterproofing agent. Its usefulness in paper sizing resides in a surface coating of aluminum rosinate on the rosin particle. In other words, the aluminum ion, and not rosin, is the primary consideration and controlling factor in engine sizing. The aluminum ion is hydrolyzed and destroyed by high water temperatures. The presence of the hydroxide ion, of course, increases the destruction. Aluminum ions are on the pulp and rosin by an ion exchange mechanism so other ions, particularly the hydrogen ion, can chase them off.

Sizing is thus extremely vulnerable to warm water or high or low *p*H, and this shows up on all types of sizing tests. Figure 12 shows at the top how the wet break test is affected by the temperature of the soaking water and at the bottom how the test is affected by the *p*H of the water. The sizing operation, itself, is of course subject to the same variables although the optimum *p*H of the white water is much lower because we are dealing with ionization and exchange phenomena in solutions which are quite concentrated as compared to pure water.

We rather like the wet break test. We suspect that the principal reason for engine sizing is to obtain wet strength for subsequent wet converting operations. It seems more sensible to measure a desired property directly than to beat about the bush with other tests. The necessary apparatus can be assembled in a few minutes in any

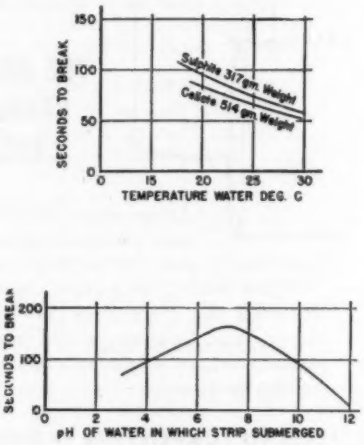
SECONDS TO BREAK
TEMPERATURE WATER DEG. C
Sulphite 3/7 gm. Weight
Celsate 5/4 gm. Weight
SECONDS TO BREAK
pH OF WATER IN WHICH STRIP SUBMERGED

Figure 12

laboratory. There is no question about the end point. A blind man can hear it or a deaf man can see it from across the room. The complete curve offers an insight into the quality of the paper not afforded by other methods with only a single test or end point. However, no single test tells the whole story; but an understanding of what each test means can lead to a surprisingly accurate estimate of what is right or wrong with a given sheet and how to correct it.

Experimental Application of Combustion Controls to a Process Heater*

W. E. BOYLE[1] and PAUL R. HOYT[2]

Causes of Fuel Shortage

Petroleum products, whether in the form of gas or liquid, are ideal fuels for most industries since: (1) the cost is comparable to other types of available fuel, (2) due to its fluid state, both handling facilities and burner and fire box design are simplified resulting in lower initial cost, and (3) control systems with comparatively simple mechanism can be used to obtain optimum combustion efficiency. Due to these advantages, an increasing number of industries in recent years have turned to petroleum products as a source of fuel.

(*) Abridgment of paper delivered at the Conference of the Instrument Society of America, September 13-17, 1948, Philadelphia Convention Hall.

(1) Shell Oil Company, Inc., Wood River, Ill.
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Fuel Conservation Program

Thus, with the demand for fuel increasing, and the available fuel stock diminishing, it is not difficult to see why a shortage of fuel has developed. Conservation of fuel is, therefore, of major interest to most industries today, and methods for improving combustion efficiency are receiving more and more attention.

In establishing a conservation program, particular attention is being given to the design and operation of process heaters. In the past, these heaters were designed by the manufacturers with little thought given to combustion efficiency, but rather to such factor as operating convenience, ease of cleaning and replacing tubes, and low initial cost. In operation, every effort was directed toward maintaining the outlet temperature of the oil at a constant value, with combustion efficiency being of secondary importance. The operator responsible for furnace operation, in many instances, was assigned other duties on the process.

In contrast, the maintenance of efficient combustion control under all load conditions has been the first design consideration of steam generator manufacturers. Elaborate automatic control systems have been developed not only to guarantee optimum combustion for all loads, but also to assure correct proportioning of combustion air flow and fuel flow during load changes. In operation, a fireman usually devotes his full time to observing combustion conditions.

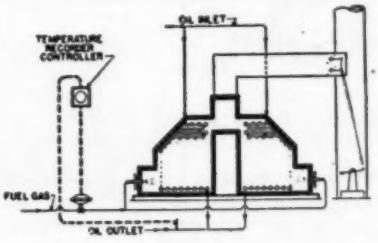

Figure 1

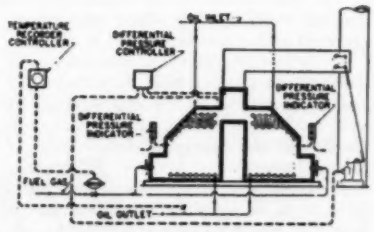

Figure 2

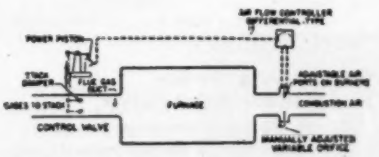

Fig. 3—Equivalent air flow control system

Improved Combustion Efficiency Effects Fuel Savings

It was found that in many instances combustion efficiency could be improved vastly without having to make major alterations to the burners, fire boxes, or fuel systems. The basis for improvement lay in using the flue gas analysis and observing furnace temperatures and pressures as guides for obtaining optimum combustion efficiency and balancing the heat load.

To realize significant fuel savings, however, continuous attention would be required. This could be accomplished only by increasing personnel or using suitable automatic combustion control equipment. The former was initially tried but found to be impractical. In the first place, with the equipment available, technical personnel were required to take and analyze the data in order to make the corrective adjustments. In most cases, it was found that load changes occur frequently and in order to assure sufficient combustion air for peak loads, it was necessary to adjust air flow for these conditions. Obviously this resulted in excess stack heat losses during normal operation, thereby limiting potential savings which could be effected by continuously adjusting air to suit fuel demand. It was apparent, therefore, that automatic controls would be required, preferably with records of the important variables to be controlled and easily read indications of other conditions to enable the operator to analyze quickly operation of the furnace as a whole and make any necessary manual adjustments on individual components.

Application of Automatic Controls to Process Heaters Studied

A survey was made of equipment available and of methods tried in the past for applying automatic combustion controls to similar types of furnaces in process service. Results of this survey indicated that it was impractical to design a control system applicable to refinery process heaters in general. Due to the variety of heater designs, arrangements of burners and combustion air adjustment, it would be necessary to design a control system for each individual furnace. Despite this fact, it did seem reasonable that basic principles of combustion control methods could be applied to many heaters. In order to establish these principles from a practical standpoint, and to evaluate manufacturers' standard equipment, it was decided to make an experimental installation. For this purpose, a heater was selected in a heat medium service where the only operating requirement is to release heat in an amount and at a rate to elevate and maintain the temperature of flowing oil at a constant predetermined value. The oil flow is at a constant rate and does not vaporize or change state with temperature change.

This heater is a conventional radiant type, two cell, natural draft furnace. Fired by 14 burners from each side wall, it is designed for 50,700,000 btu per hour heat release, and is illustrated by a schematic cross section view in Figure 1. The burners are of the conventional combination fuel gas, fuel oil-steam atomizing type. Primary air is adjusted manually on each individual burner by louvres, while furnace draft is controlled by a multiple vane type stack damper. Fuel oil and atomizing steam are also manually adjusted by hand valves on individual burners. Combustion gases leaving the radiant sections pass through the convection sections into a common flue gas duct and out the stack. The oil enters the tubes in two parallel streams from a common header, flows through the convection tubes, roof tubes, floor tubes, and then out to a common header again.

In the original arrangement, the outlet oil temperature was automatically controlled by a pyrometer type instrument with a primary element located in the oil outlet line. The controller output air pressure loaded a pressure balanced type diaphragm valve in the fuel gas line. In order to conserve fuel gas, it is normal practice to base fire manually to supply about 80% of the normal heat load demand. Since heat load fluctuations exceed 20%, constant outlet temperature is maintained by the temperature controller operating the diaphragm valve in the fuel gas line.

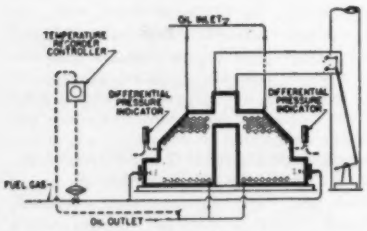

Figure 4

With these operating conditions in mind, let us summarize some of the requisites considered desirable from an operating and maintenance point of view which influenced the design of the system and the types of equipment selected.

1. Sufficient continuous records and indications of the variable which affect combustions, thereby enabling the operator to analyze quickly furnace operation at all times.

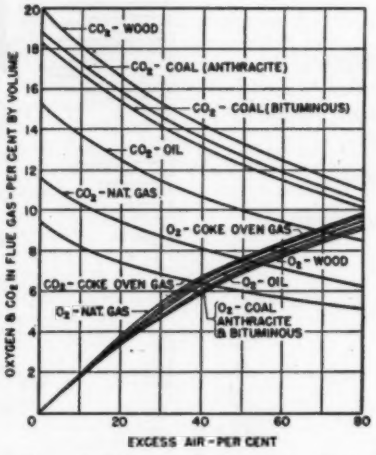
OXYGEN & CO_2 IN FLUE GAS - PER CENT BY VOLUME
EXCESS AIR - PER CENT
CO_2 - WOOD
CO_2 - COAL (ANTHRACITE)
CO_2 - COAL (BITUMINOUS)
CO_2 - OIL
CO_2 - NAT. GAS
O_2 - COKE OVEN GAS
O_2 - WOOD
CO_2 - COKE OVEN GAS
O_2 - OIL
O_2 - NAT. GAS
O_2 - COAL ANTHRACITE & BITUMINOUS

Figure 5 (Courtesy Bailey Meter Co.)

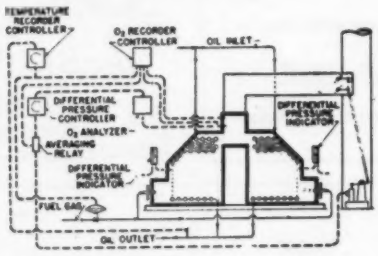

Figure 6

2. For operator's convenience, central location of the instruments indicating, recording, and controlling these variables, preferably adjacent to the process instruments.

3. Design the system for simplicity with as few components and interconnections as possible to avoid specialized training of operators and instrument men.

4. Where possible, use components of standard design preferably furnished by a manufacturer who is thoroughly familiar with combustion control systems and with the design and operating requirements of process heaters.

5. Initial cost of the installation should be such as to permit a reasonable payout time, based on fuel savings affected by improved combustion efficiency.

6. Design must conform to safe operating practices.

7. System must be stable and should not influence or upset process operation.

Development of System for Experimental Installation

One of the fundamental requirements of combustion control is the regulation of fuel and combustion air flow in the correct ratio to give optimum combustion. As an operating guide it is, therefore, desirable to measure and indicate or record the instantaneous flow rates of these two variables. The measuring of fuel flow offered no problem as there already were existing meters on both the fuel oil and fuel gas lines. Means for actual measurement of air flow, however, were not immediately apparent. The conventional methods used in many boiler furnaces provided with forced air systems obviously could not be applied on natural draft furnaces of this type. It was decided, therefore, to use the fire box pressure as an indication of rate of air flow. If we consider the burner air ports as a fixed orifice or restriction, then the differential pressure between fire box and atmospheric pressure is related to the rate of air flow through the ports.

For measuring this differential, two slack diaphragm type differential indicators were provided for each fire box and connected as shown in Figure 2. In order to assure measurement of actual differential pressure across the burner ports, the high lead from the differential unit was located with its open end adjacent to and in the same plane as the atmospheric side of the burner ports. The low pressure lead terminated in the fire box. These instruments not only provided a means for detecting air flow changes, but also served as a guide for equalizing both cells of the furnace.

Let us assume that the individual burner ports are adjusted at some optimum fixed opening. By varying the opening of the uptake draft damper, a change of furnace pressure or differential pressure across the ports will produce a related change in the rate of air flow. In order to have automatic control, it is a simple matter to connect the low pressure side of the measuring element of a differential pressure controller to the furnace and have the controller output pressure position the damper. This is equivalent to a conventional differential type flow control system, Figure 3, and an actual installation was made as shown in Figure 4. The differential element of the instrument used was of the same type as the indicators previously mentioned.

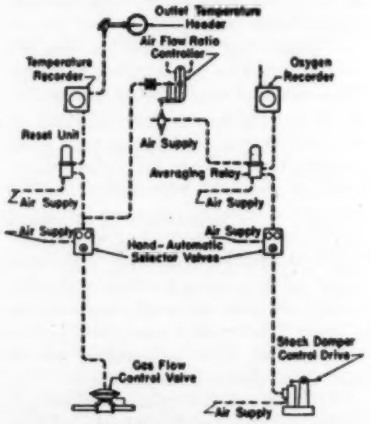

Fig. 7—Schematic diagram of control circuit (Courtesy Bailey Meter Co.)

We now have provided means for measuring and controlling the total combustion air flow only for a fixed heat load. Fuel flow, however, is automatically varied by

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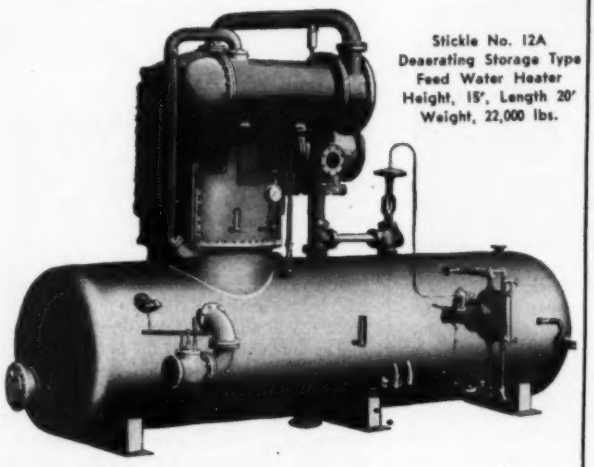

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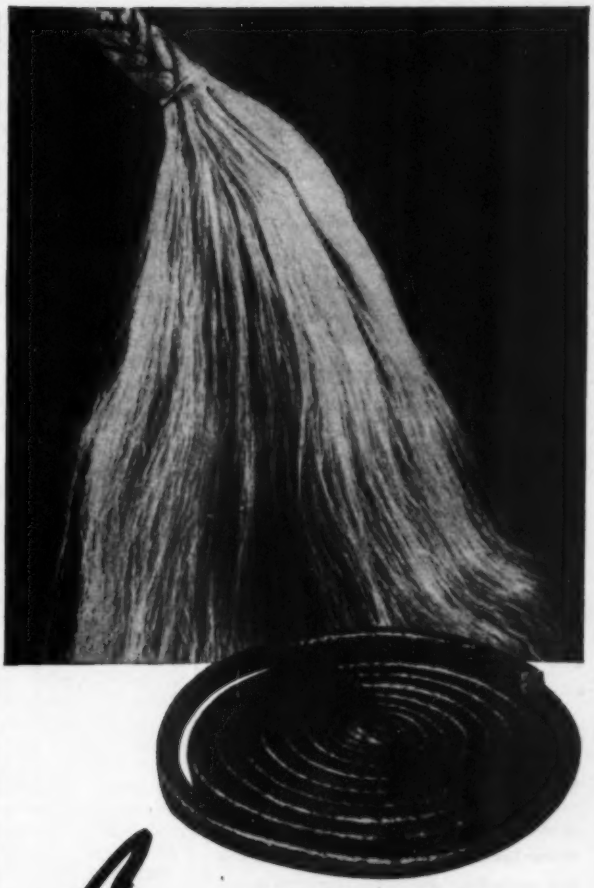

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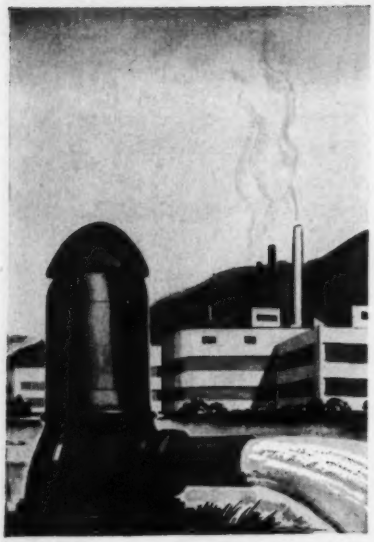

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the temperature controller to balance fluctuating heat load demands. It is desirable to vary air flow simultaneously with fuel flow. Since the temperature controller output pressure is proportional to heat load demand, it was utilized for this purpose and connected to the air flow controller through an adjustable ratio mechanism. For a given ratio adjustment, this pressure sets up a proportional demand for air flow which is satisfied only when balance is restored by the flow controller. Thus, we have a method for automatically changing the rate of air flow in a predetermined ratio with fuel flow changes demanded by the temperature controller.

It may be apparent to some that the system developed thus far has one major objectionable feature which limits its use as a completely automatic control system. The ratio of fuel flow to air flow should be a fixed ratio regardless of heat load. Due to the principles on which the fuel flow and air flow are measured and the effective characteristics of the controlling elements, this condition cannot be maintained unless the ratio mechanism is manually readjusted as the load changes. In order to maintain automatically the desired ratio over the complete operating range, specially constructed compensating mechanisms would be required. A more desirable method appeared to be the use of a device for continuously measuring combustion efficiency as a means of furnishing final corrective action.

As is well known, the most economical combustion condition must be determined at some optimum value of excess air for each furnace installation. Above or below this value, controllable losses increase. A continuous measurement of excess air is then the best criterion of optimum combustion efficiency. In the absence of a known practical method of measuring excess air directly, it was decided to measure the oxygen content of the combustion gases. The relationship of oxygen to excess air for different types of fuel is shown in Figure 5. The primary advantage of measuring oxygen content as an indication of the amount of excess air, is that the relationship changes very little regardless of fuel type. The CO_2 content, however, varies considerably for a given amount of excess air and cannot be used to advantage where fuel oil and fuel gas are burned simultaneously.

An oxygen analyzer and a recorder controller were therefore selected. The analyzer operates on the catalytic combustion principle. Measured quantities of combustion gases and a vaporized liquid fuel, both maintained constant by flow regulation, are passed over a catalytic filament. The heat liberated by combustion maintains the filament at a temperature proportional to the oxygen content of the sample. The electrical resistance of the filament is proportional to temperature variations. The filament forms one leg of an ac bridge which is continuously balanced by an electronic detector through a motor driven slide wire. This motor also positions the pen on the chart, calibrated directly in per cent oxygen, and actuates the control mechanism.

Operation

A schematic diagram of the complete control circuit with component parts is shown in Figure 7. The control unit of the temperature recorder is of the conventional pneumatic type with adjustable proportional band. The output loading pressure is transmitted to a standardizing relay, providing proportional speed-floating action. The output pressure from this unit, representing fuel demand, loads the pressure balanced diaphragm control valve in the fuel gas line through a manual automatic selector valve. This same loading pressure is also transmitted to the ratio mechanism of the air flow controller where it is balanced against a differential pressure which represents the measurement of the rate of air flow. The resultant output pressure is connected to one chamber of an averaging relay or totalizer. The other chamber of this relay is loaded by the output pressure of the oxygen recorder controller. The relay output pressure, equal to the sum of these two pressures, is connected through a manual automatic selector valve to the power piston positioning the stack damper. The damper controls the rate of air flow. The control unit of the oxygen recorder has adjustable proportional band action.

To illustrate the sequence of operation, let us assume a state of equilibrium. Heat is being supplied in an amount and at a rate to hold the outlet temperature of the oil at the control point. Also, the rate of air flow is proportioned correctly with fuel flow to maintain the oxygen content of the flue gas at a value selected to give the most efficient combustion.

Furthermore, let us assume that due to a heat load increase, the outlet temperature falls below the desired value. With a drop in temperature, the output loading pressure increases a proportionate amount, causing the pressure balanced valve to open until the fuel gas pressure increases to again balance the loading air pressure. (This loading pressure continues to increase, due to the reset action of the standardizing relay, until the temperature returns to the control point.) The higher gas pressure produces a higher differential across the burner orifices, thus increasing the fuel gas flow rate.

At the same instant that the gas flow increases, the combustion air flow rate increases in a related amount depending on the ratio adjustment between the loading pressure and differential pressure representing air flow. If the increased fuel and air flow rates are not in the correct ratio to maintain the same combustion efficiency, the resulting change in per cent of oxygen in the flue gas will cause an offset from the control point of the oxygen controller. Output loading pressure changes proportionately, increasing with a decrease of oxygen and decreasing with an increase of oxygen. The output pressure from the averaging relay in turn changes an equal amount, repositioning the uptake damper and causing a rate of air flow change in a direction and an amount to return the oxygen content to the desired value.

Results

Very little difficulty was experienced in the initial operations of the system. Once the optimum adjustments of the control units had been established, the system was found to be quite stable and responsive to load changes. Of significance was the short measuring time lag of the oxygen control circuit. This permitted operating with a

very narrow proportional band adjustment.

As anticipated, a satisfactory ratio adjustment between loading pressure and air flow differential could be established only over very limited load changes because of the non-linear relationships as outlined previously. However, by setting the ratio adjustment to minimize the effect of temperature controller action, the air flow is changed instantaneously with fuel flow change in the right direction by a limited amount. An increment of time later, the oxygen controller readjusts the air flow to maintain the desired combustion efficiency.

In effect then, most of the corrective action for maintaining combustion efficiency is furnished by the oxygen controller. In view of this, and the negligible time lag of the oxygen control circuit, the air flow ratio controller was later disconnected from the control system. The averaging relay was reconnected as a standardizing relay furnishing proportional speed-floating action for the oxygen controller. With this arrangement the temperature controller operates only the fuel gas valve, and the oxygen controller operates the stack damper independently. This offers the advantage of simplicity with little if any sacrifice in combustion efficiency.

It has been found that further improvement to combustion efficiency is limited only by the design of the burners and furnace combustion chamber. At low loads the control point of the oxygen controller cannot safely be set to a value lower than approximately 8.5% O_2 which corresponds to 64% excess air. Due to excessive air infiltration around the burner ports and other sources, further lowering of the O_2 control point will result in positive fire box pressures. On high loads the oxygen control point is normally set around 4.5% O_2 or 25% excess air. Further lowering of the control point increases fuel consumption for the same heat release, due to unburned gases resulting from inefficient burner mixing. Also, for most efficient operation it is necessary to readjust the burner air port openings manually for widely varying loads. If the burner port opening adjustments, made at low loads, remain the same at high loads, excessive negative furnace pressure results. This is due to the oxygen controller opening the stack damper to increase the air flow and thus increase the pressure drop across the burner ports. As the furnace pressure becomes more negative, air infiltration around the furnace doors and tube supports increases resulting in increased stack losses and also causing the oxygen recorder to indicate an O_2 value above that corresponding to excess combustion air.

Even with these limitations, the improvement in combustion efficiency, attributable to the control system, represents a reduction of fuel consumption averaging 15%. Based on fuel savings alone the payout time for the complete installation on this furnace was approximately 3½ months.

Conclusion

Aside from the immediate economic benefits and fuel savings resulting from this experimental installation perhaps of greater significance is the successful demonstration of the oxygen analyzer as a practical instrument for controlling purposes. It offers a comparatively simple method for indirectly recording and controlling excess air or degree of combustion efficiency. After two years of nearly continuous operation, maintenance requirements have been much less than normally expected for the sampling and analyzing type of instrument.

It should again be emphasized here that it is not our intention to recommend a universal combustion control system which can be arbitrarily applied to existing heaters, neither is it intended to imply that the basic principles involved are the ideal nor that the best methods have been used. It does, however, demonstrate that by careful analysis standard control equipment can be applied to many existing furnaces to improve combustion efficiency and materially reduce fuel consumption.

It has definitely been established by this experimental installation that further savings of fuel is not limited by lack of suitable measuring and controlling devices, but rather by the inadequacies of present burner and furnace design.

Acknowledgments

The authors are indebted to P. A. Gibbon, Shell Development Company, for his aid in preparation of this manuscript; J. G. Kerley, Shell Oil Company, for helpful discussion; The Bailey Meter Company for furnishing certain material and data.

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Future Pulpwood for Wisconsin Mills*

M. N. TAYLOR, Executive Director
Trees for Tomorrow, Inc.

The manufacture of paper is closely associated with the social and economical well-being of this state (Wisconsin) and of the nation. The fact that wood has outgrown its single purpose use as lumber is dramatically brought out by the following: Papermaking ranks as Wisconsin's third industry and the nation's sixth industry. Still, throughout the country, this industry uses only ten per cent of the timber consumed. As superintendents of mills in a great paper producing section of the country, you are charged with the responsibility of maintaining an uninterrupted flow of paper products made from the raw material—wood. For this reason it is only natural to feel that you are concerned with the establishment of a permanent and local supply of this raw material.

Forests are a resource of tremendous importance to Northern Wisconsin communities. A nearby sustained yield forest assures to the community continuous employment, sound local markets for farm products, permanence of local business and permanence of local wood using industries. Managed woodlands provide a steady cash income to people who invest in this security.

(*) Address given before Northwestern Division of the American Pulp and Paper Mill Superintendents Association, at Merrill, Wis., September 24, 1948.

Much of the past economic progress of Wisconsin has come from a natural wealth of merchantable timber. Our future destiny will be founded to a great extent upon the manner in which we manage and restore our forest resources.

Today, forestry is the strongest single influence in determining northern Wisconsin's economic development.

Origin of Trees for Tomorrow

It might be practical to explain what Trees for Tomorrow is and what constitutes its program.

Laying down a pattern whereby ten paper mills can help grow more trees, project good forestry to small woodlot owners, to schools, and to entire communities is the program of Trees for Tomorrow.

The organization was founded in February, 1944, as a non-profit organization of the Wisconsin Valley papermaking industry with Folke Becker of Rhinelander Paper Company as president. Other officers are: E. B. Hurst, Consolidated Water Power and Paper Company and C. G. McLaren, National Container Corporation of Wisconsin, vice presidents; D. B. Smith, Ward Paper Company, secretary and treasurer, and M. N. Taylor, Executive director. Member mills are: Consolidated Water Power and Paper Company, Whiting Plover Paper Company, Mosinee Paper Mills, Marathon Corporation, Wausau Paper Mills, Ward Paper Company, National Container Corporation of Wisconsin, Tomahawk Pulp Company, Rhinelander Paper Company, and Flambeau Paper Company.

In 1870, Wisconsin was covered with a rich green carpet—20 million acres of virgin conifers and hardwoods. In 1944, the State Conservation Department reported there remained only 44 thousand acres of virgin timber.

Something of an economic paradox exists at the present time. The paper making industry in the Wisconsin River Valley, one of the most concentrated papermaking regions of Wisconsin, represents investments of more than 100 million dollars in plant equipment. At its height, the lumbering industry had no such investments. Still, the raw material, wood, from which paper is made, is obtained only in small amounts within the boundaries of the state.

A line on a map traces the course of the Wisconsin River from Otter Rapids through north central Wisconsin in Wood county. Along its course are 22 reservoirs and 23 power dams, representing a producing investment by private capital of millions of dollars.

Through this system of reservoirs, the Wisconsin River at the present time supplies two of the three natural resources essential to papermaking—power and clear water.

The third natural resource essential to the manufacture of paper—trees—can and should be grown at home.

Papermaking in most of these communities is the heart beat of industry. True, its finished product is taken for granted like the water we drink and the air we breathe, but its manufacture has far reaching social and economic ramifications. In some of

these communities, 73 per cent of industrial employees are paper mill workers.

Paper mills in this region spend annually 10 million dollars for pulpwood, 80 per cent of which comes from outside the boundaries of Wisconsin. As businessmen, as well as mill superintendents, you can visualize easily how the flow of cash spent to harvest this crop in Wisconsin would bolster the economic structure of the northern section of the state.

The paper mill payroll is the largest on the Wisconsin River, and papermaking contributes the largest amount to the state and counties in taxes.

The present economic paradox is further pointed up by the following: Within the confines of 26 northern Wisconsin counties are 10 million acres of land which are suited only for forests and for recreational purposes.

Certainly the job ahead is big, but so are the benefits that can accrue to all of the state. Of prime importance is the fact that this region can supply Wisconsin's third industry with an annual 30 million dollar crop of home grown pulpwood.

There are four factors that make a large scale, long range forestry program practical. They are: 1. Forest zoning. This zoning prohibits the starting of farms on land that is not suitable for agriculture. 2. Forest fire protection. Wisconsin now ranks at the top of the nation in forest fire protection. 3. The large forestry programs now under way by federal, state, and other agencies, and the industrial forestry programs of industry. 4. A growing consciousness on the part of the small land owner, who owns 57 per cent of the commercial forest land in the state, that timber can be harvested as a crop.

How can private industry play a role in building this new "Green Frontier" for tomorrow for its own mutual benefit and for the benefit of the entire state?

The individual forestry programs of some of the member mills of Trees for Tomorrow got under way as far back as the 1920's. These mills own 450 thousand acres of forest land on which 30 million trees have been planted. They employ 25 foresters.

These paper mills recognize the responsibility on the part of industry to help build a natural resource from which to draw future supplies of raw materials.

The Job Ahead

Three and one half years of research in the field have proved that industry as a unit, without duplicating what is being done, can afford to spend time, money, and effort as a semi-public organization in forestry. The Trees for Tomorrow program is separate from that of individual member mills.

There are 17 million acres of forest land in Wisconsin with a total of 4½ million unproductive acres. The job ahead, as we see it, is too big for industry or any single public agency; and it will require a lot of education and selling to get private landowners, who own the greatest share of this acreage, to do their part. It can best be accomplished through co-operative effort.

Because of the long range aspects of forestry, Trees for Tomorrow realizes that it is only common sense to begin by capturing the enthusiasm and by directing the thinking of boys and girls in school today so that they will be in an informed position to manage our natural resources tomorrow. However, before students can be interested, it is necessary to interest school officials and faculty members. This is accomplished in Northern Wisconsin through field institutes in the summer and conservation seminars in the winter. It is at these meetings that school members exchange ideas and information and return home with renewed enthusiasm for the program under way in each of their respective communities. They understand that schools have an important role to fill in building a citizenry capable of dealing sensibly with conservation and full use of our natural resources. As a result, accredited forestry conservation classes are now a part of the curriculum of a number of schools.

In all of these schools, time is taken from regular class room periods to study conservation. This work is considered important enough to have a regular part in the public schools class room schedule.

In fact, school forests are becoming an accepted part of school life. They function in the same way as does the laboratory in a chemistry class in carrying out a class room program. These forests are mapped by students with the help of a Tress for Tomorrow forester who lays out a program for their full development. As many as 40,000 trees have been planted on a single school forest in one season.

Forestry Scholarships

Five senior students from twenty-nine schools are eligible each year to receive $2500 in Trees for Tomorrow forestry scholarship awards. Applicants fill in entry blanks, write essays, and are interviewed by local award committees.

To compete each boy must obtain an application blank from his principal. After filling in the blank he returns it to the principal who in turn sends it, with a questionnaire he has answered to the Trees for Tomorrow office. This questionnaire gives the boy's IQ, his standing in his class, and general information concerning him. Scholarship winners have entered the University of Minnesota, Michigan State College, University of Michigan, Syracuse University and a number are considering the University of Wisconsin and certain other state colleges.

Memorial Forests

Memorial forests provide a means whereby all of the people can play a role in rebuilding the natural forest resources of the region.

The largest memorial forest in the region is located in Oneida county where 11,000 acres have been set aside as a perpetual living memorial to Oneida county boys who died in the service of their country. Initial interest in a memorial forest can be stimulated by an outside organization, but the real work of creating the forest must come from the people within the community themselves.

Conservation Camp

During the summer months, Trees for Tomorrow operates a summer camp at Eagle River in co-operation with the U.S. Forest

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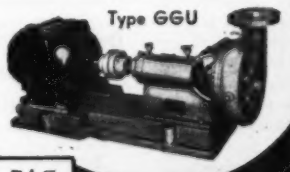

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Service. This season the camp opened on May 1 and is still in operation. Tonight, a new group of 60 will register in. During the past six months, citizens, both young and old, of 67 Wisconsin counties and 42 states throughout the nation, have attended sessions.

Groups represented included a five weeks' summer school sponsored by nine State Teachers Colleges, boys and girls from 4-H Clubs, a class from the University of Wisconsin, periods sponsored by the Milwaukee Public Museum, the Milwaukee Conservation Alliance, the Institute of Paper Chemistry, Wisconsin Valley high schools, Future Farmers of America, and in-training sessions of the State Conservation Department and U.S. Forest Service. The camp will continue operation until November 1.

Land Owners

The small land owners hold the key to projecting good forestry.

Because of the very peculiarities of forestry by which every woodlot poses a different problem, on the spot advice and follow-up are necessary to bring all phases of a well-rounded program to a successful conclusion. Intensive forestry is essential in North Central Wisconsin. This region comprises a cross section of soil, planting, and economic conditions found throughout the entire state. There are the cut-over and wild land counties in the north, the central farming area, and the sandy soils of the two southern counties. Each land owner may be growing, managing, or harvesting trees for a different reason.

Reforestration is featured prominently because it provides initial contact with land owners. The following procedure is used in the distribution of trees: All requests are screened as to soil, conditions, type of ground preparation to be used, planting standards, and the species of trees available for planting. The trees are distributed throughout each county at a set time and place and following a tree planting demonstration.

It is the purpose of the tree distribution plan to get seedlings into the hands of land owners who would not otherwise order trees through regular channels. The minimum order is for 500; the maximum 5000. Many things are learned as a result of contacts with land owners. The development of forest management plans is the most important item to come from this knowledge.

Another important observation is the interest shown by absentee land owners, individuals who are not farmers.

It is the immediate purpose of the program to maintain interest in reforestation until 80 to 100 million trees are available each year from state nurseries. Planting 100 million trees a year will cut the required time to reforest unproductive acres from 125 years to 25 years.

During the past four and a half years, Trees for Tomorrow has distributed 2½ million trees to private land owners. Assistance has been given in the establishment of 25 school forests and four memorial forests. Twenty-five thousand acres of privately owned woodland have been mapped and placed under forest management. Ten-thousand dollars have been awarded to forestry scholarship winners, and support has been given to programs and projects that fight public apathy and indifference—all to the end of creating interest in forestry and an understanding of its value.

The results of stepped up interest in reforesting unproductive acres in a minimum amount of time and in managing productive acres are clearly indicated in the progress made by the people of this region.

Two years ago, when planting stock was available in unlimited quantities, Wisconsin led the nation by planting 13 million trees. One-third of those trees went into the ground in counties which comprise the Upper Wisconsin River Valley—making this area probably the most highly concentrated tree planting section in the country.

There are 214 school forests in Wisconsin. More than one-fourth of these forests, actually 67 of them, are located in these same seven counties. The largest school forest, 700 acres, and the largest community forest, 840 acres, and the largest memorial forest in the state are located in the area.

Deflecting a segment of the will and might of our people to a practical understanding of the far-reaching social and economic aspects of forestry, and then crystallizing this thinking into action is the voluntary task to which Trees for Tomorrow is dedicated.

Deinking Wastepapers with Sodium Peroxide*

J. H. HEUER, Technical Director
St. Regis Paper Company

Recent trends in the pulp and paper industry have led to a need for improved techniques in the recovery of used papers. The wastepaper industry has expanded tremendously in the past few years, mainly because wastepaper is cheaper than virgin pulp and more available.

Conventional recovery processes for wastepapers that are essentially free from groundwood have demonstrated shortcomings when applied to wastepapers with substantial groundwood content. Consequently, as increasing quantities of groundwood enter into paper manufacture, new problems arise in connection with the deinking and bleaching operations in recovery processes.

(*)Abridged from paper read before the Michigan Division of the American Pulp and Paper Mill Superintendents Association at regular meeting held October 21, Kalamazoo, Mich.

The conventional recovery processes consist of deinking with caustic soda, soda ash, or other alkaline chemicals, utilizing high temperature and long cooking periods. It was due to the degradation and darkening effect that these alkalis had on groundwood, and to the acute shortage of a great number of these alkalis during the war, that led a number of companies to carry out an investigational program which led to the development of an improved process for deinking papers containing large amounts of groundwood.

It is the general consensus that to obtain satisfactory deinking, mechanical action plus chemical action and heat are required. Mechanical action defibers the paper. Chemical action puts the ink vehicle in a form in which it can be removed more readily. This could be saponification, selective wetting or emulsification. Heat speeds up the mechanical and chemical action.

Assuming these statements are basic truths, there must be an optimum ratio between them for any given set of conditions.

The sodium peroxide process for deinking recovered papers includes the following operations: The waste papers, after treatment in a hydrapulper or some other type of defibering equipment with a solution containing an alkali and sodium peroxide, are subjected to a mild cook.

Better utilization of waste papers has resulted from the introduction of sodium peroxide into the deinking operation. This favorable influence of sodium peroxide is considered due to its ability to modify and disperse the various ink vehicles as well as starches, glues and other organic components encountered in waste papers. Sodium peroxide is an alkaline peroxide bleaching agent, containing 20 per cent active oxygen. The peroxide persists to the end of the cooking step, in concentrations sufficient to inhibit the color reversion that groundwood undergoes when subjected to hot, alkaline treatment.

Economic and technical advantages have derived from operating the sodium peroxide deinking process over the past year. It is practical to utilize a lower grade of waste papers and yet meet the standards of paper quality. It has been possible to increase the amount of magazine stock from 50 per cent to 75 per cent and reduce the amount of ledger stock from 50 per cent to 25 per cent.

Using sodium peroxide in the deinking operation, results in an increase in the overall chemical costs. However, the other advantages of sodium peroxide in the deinking operation more than compensate for this increase in chemical costs.

The amount of alkali used for operating the sodium peroxide deinking process is approximately one-third of the requirements for satisfactory results in the alkali deinking process. This decrease in alkali requirement is due to two factors: (1) Satisfactory deink-

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Maurice Norton

Maurice Norton is typical of thousands of Maine workers who take pride in their work and really get the most out of life. Excellent manpower is only one of the many advantages you'll find when you locate your plant in Maine. These include: easy access to the nation's largest markets; many raw materials close by; pure processing water; year round production weather; excellent transportation; fair taxes, no State sales tax, no State income tax.

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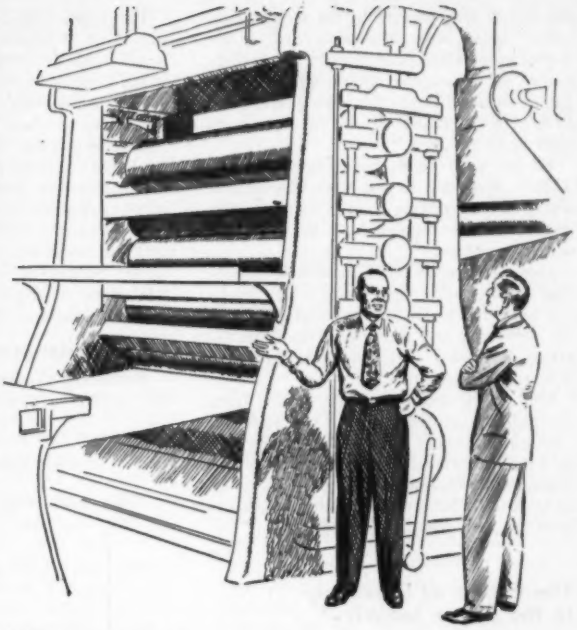

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Butterworth Calender Rolls

ing results are obtained in the sodium peroxide process with less alkali than is required in the alkali process. (2) Steam costs due to reduction of cooking temperature together with a decrease in cooking time have effected a substantial saving in the use of high pressure steam.

Higher pulp yields have been obtained. This is attributed to less fiber degradation under milder cooking conditions and lower temperatures encountered in the peroxide deinking process.

Increase in production capacity is obtainable from existing equipment in the deinking mill, due to the shorter time schedules for defibering and cooking. This is necessarily dependent upon adequate screening and washing facilities.

One of the most important results from the sodium peroxide process has been the leveling influences and greater uniformity in the brightness of pulp obtained after the sodium hypochlorite bleaching operation. In addition to better uniformity, the brightness level has been raised appreciably.

The Future of Research in the Paper Industry*

DR. LOUIS T. STEVENSON, Economist
American Paper and Pulp Association

There are today many types and kinds of research, all of them based upon inductive reasoning, that is—establishing facts and then deriving generalized rules from the established facts.

In the paper industry, research may be classified in three major patterns:

1. Market research—measurement of the size, location and intensity of markets.
2. Production research, including management techniques, processes and methods.
3. Raw material research.

To operate successfully today, a paper mill must be up-to-date with respect to raw materials, production and markets.

There is a vast field for research in each of these subjects. I presume that you are especially interested in the aspect of wood as a raw material for the paper industry.

Research Developed Use of Wood

About the middle of the 19th century the research activities of Voelter in Germany, Burgess in England, Tilghman in the United States and Fry, Ekman and Dahl in Sweden opened up the vast wood resources of the world as a source of raw material to the paper industry. The world paper industry then started a phenomenal growth which was nowhere more phenomenal than in this country. Production was doubled every ten years from 1870 to 1910.

Paper as a commodity depends for its market upon the low cost service which it renders. Consequently, the search for low cost materials is constant and intense. This motive prompted the research which developed the wood using processes. The pressure to reach out and secure otherwise unused raw materials is always with us. This pressure is primarily economic and, as it is the motive power behind a great deal of the current research, it may be well to examine briefly its economic background.

(*) Abridgment of address presented at the meeting of the Forest Products Research Society, New York City, October 22, 1948.

The paper industry this year will make very close to 22,000,000 tons of paper and board. About 90% of the fiber will be wood, some 30% of it reclaimed from waste paper. About 64% of the finished production is derived from virgin wood.

This will mean, after making allowances for imported wood pulp and pulpwood, the consumption of about 18 million standard cords of domestic wood in the United States pulp industry in 1948. The pulp industry in 1944 consumed 14,500,000 cords of domestic pulpwood, less than 10% of the total drain on the forests from all sources, including fire and insect losses.

Raw Material Sources

Estimating the future pulpwood needs of the industry is a complex problem, the answer to which depends somewhat upon what goes on in research. Every leafy green plant and tree is a possible source of cellulose, the papermaking raw material. How much of the annual fiber growth will be usable in economical papermaking processes in 10 years from now? How much wood will be replaced by it?

Already in use in limited fields are cotton, flax, sugar cane and straw. Will some other annual such as wheat straw, replace wood and if so to what extent? It depends upon research!!! Not only research in the raw material field but also research in the manufacturing and marketing fields.

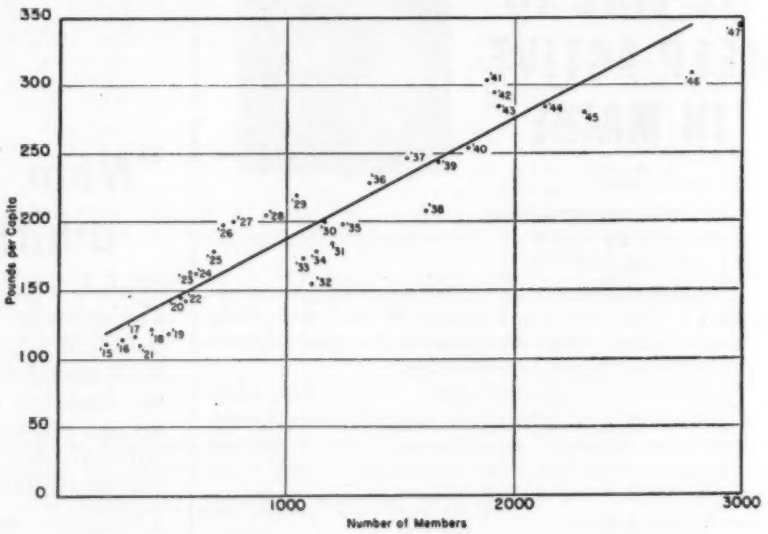
Another research problem is the use of other wood species than are now currently being used for pulping. This is certainly a most active field at the moment. The Lake States, for example, deficient in spruce, have a surplus of aspen.

In the last 30 years through research the United States paper industry has been able to expand into very large Southern and large Pacific Coast production.

In 1913 it was seriously held by many that because the United States stands of northern spruce were limited there was little prospect for growth in the United States paper industry. Since then, due to results of research into pulping southern pine and other species, total paper production has grown from 5,000,000 tons to 22,000,000 tons annually and it is still growing. Estimates based upon trends of population growth and per capita consumption of paper indicate that by 1955 the overall consumption of paper and board can be expected to reach 30,000,000 tons annually. This will require domestic production of 25 to 26 million tons, allowing for a normal growth of imports.

Some authorities have indicated that our supply of timber is limited and that our supply of paper must be limited to the available timber. Thus the inference is drawn that the dynamic paper industry must become a static industry.

PER CAPITA PAPER CONSUMPTION AND T.A.P.P.I. MEMBERS



While acknowledging that the present timber supply is limited, what is to prevent: (1) The use of additional unused species? (2) The increased and intensified use of the present forests through careful sustained yield operations? (3) Reforesting large areas? (4) The use of annual fibers? All of this requires research. It may be research into wood utilization or forestry research to get the utmost sustained yield from the available land or research into utilization of annual growth. All of these movements are currently quite active in the paper industry. The economic pressure to produce larger quantities of low cost paper is continuously posing these problems of raw material supply to the papermaker. His only "out" is vigorous, active and well directed research. Without research, the paper industry can not maintain its astonishing growth. With research activity maintained the growth can and will continue. A bright future for research in the paper industry therefore seems assured.

Requirements for Effective Research

Adequate research equipment and the men adequately trained in its use are the necessary prerequisites to effective research. These must of course be adequately financed.

There is a steadily growing interest among the paper mills in research activity. A recent survey by the Conference Board indicates that in one company as high as 2% of annual sales is being expended on research. This is the highest, but 1% is not unusual.

Laboratories

Research equipment already exists in the shape of many excellent research laboratories largely devoted to the problems of the paper industry. Outstanding among these are:

1. The Institute of Paper Chemistry, Appleton, Wisconsin, where currently 8 doctoral theses are in progress, plus an extensive research program in fundamental and applied research.

2. Paper Laboratory of the Forest Products Laboratory, Madison, Wisconsin, where an extensive program in applied research is underway together with some fundamental research.

3. Pulp and Paper Department of the New York State College of Forestry, Syracuse University, Syracuse, New York, where active work on pulping hardwoods is in progress.

4. Northern Regional Research Laboratory of the United States Department of Agriculture, Peoria, Illinois. Research on Development of Processes for Manufacture of Paper or Board Pulps from Agricultural Residues.

The major part of the research work done in the first three of these laboratories deals with wood pulp and paper made from wood pulp.

In the fourth, Peoria Laboratory, the research is devoted to developing uses for wastes from annual farm crops.

Twenty-four other institutions, in addition to private research departments, are working on stream pollution problems, waste utilization, product development, pulping hardwoods, etc.

One of the most needed projects is in the broad field of lignin research. We should actively pursue this research into the fundamental nature of wood in order to find economic uses for every possible derivative from the 50% of the wood that we have been rejecting for years as useless. Something has already been done but, while no expert myself, I am informed that the problem has barely been scratched.

Who is doing this research? Most of the men and women are members of our affiliated Technical Association of the Pulp and Paper Industry. TAPPI now has over 3,000 members. While all members of TAPPI are not necessarily research men the great majority of research men are TAPPI members.

In judging of the future of research we may look at the past record. The chart shows a scatter diagram with per capita consumption of paper plotted on the vertical axis and the number of TAPPI members plotted on the horizontal axis. There is a definitely overall tendency towards an increase in TAPPI membership as per capita consumption has grown. This tendency is indicated by the straight line.

Historically, paper consumption has been growing at a faster rate than population, hence the overall increase in per capita consumption. Historically, TAPPI membership has been growing at a fast rate. It may be that there is a causal relationship between these two facts, but it is not so asserted here. I merely point out that TAPPI has grown as the consumption of paper per capita has grown in the past. A projected trend of per capita consumption indicates that by 1955 it may reach 400 pounds per capita. Based on past relationships the TAPPI membership would reach about 3,400 at the same time or about 10¼% increase over the present membership. This may be taken as a rough measure of the probable increase in technically trained men in the industry. It could be stretched into a forecast of future research activity.

Organized Instrument Engineering*

J. JOHNSTON, JR.
E. I. du Pont de Nemours Corp.

It is increasingly apparent, to those familiar with instrument equipment, that almost every branch of industry can derive tangible benefit from an intimate knowledge of some type of measurement or control technique. It is the purpose of this paper to demonstrate the economy of providing such knowledge in the form of instrument engineering personnel. This specialized talent, whether it be represented by a full-fledged department, a single individual or only part time of an individual, can be, and is, a useful addition to almost every type of industrial organization.

Industrial processes suffer frequently from a lack of measurement and control equipment. There are instances at almost every turn where improved operations or increased safety and efficiency will result from a usable application of measurement or control.

Existing Staff Inadequate

A survey of the types of instrument organization existing in a number of representative industries revealed no consistency with respect to origin or calibre of personnel. In the majority of cases, a formal appointment of instrument staff consisting of previously trained men has never occurred. The necessity for such a staff became felt first in the plants themselves where the periodic service provided by the manufacturer had begun to fall short of plant requirements. It therefore, followed that some "handy" individual was picked out and given the assignment of caring for these very temperamental gadgets. Shortly thereafter he became swamped with the necessity for all manner of measurement and control requirements, most of which were to be obtained at zero cost. Surprisingly enough, many of these requests were satisfactorily filled by means of a couple of pounds of scrap parts and about ten pounds of ingenuity.

This was the beginning of what in nearly all cases, became the instrument engineering department as it now exists. Out of the first few individuals charged with instrument service responsibility, the man who applied himself to the mastery of the job received early recognition as the expert. On his shoulders rested the entire responsibility for all decisions relating to process measurement and control.

He was working under maintenance supervision in most cases because his first work required that he repair or replace worn out parts, keep things oiled, painted, cleaned, and checked, and made use of electrical or machine shop equipment to that end. In many cases, he is still reporting to maintenance management, and as a result, there are many instances where his outgrowth or offspring, the "instrument engineer," is a part of maintenance or mechanical engineering management.

(*) Abridgment of paper delivered at the Conference of the Instrument Society of America, September 13-17, 1948, Philadelphia Convention Hall.

—*One of the Men Behind Eastwood Wires . . .*

FRANK VAN DYKE
Puts the "Heat" on Wires

As supervisor of single-strand annealling operations, Frank Van Dyke's chief concern is with uniformity of heat treating of warp and shute wires. Here he is checking the traverse adjustment that controls take-up of each wire as it comes from the annealling furnace and goes on the spool. Nine years with Eastwood, Frank knows that every detail is important. It seems like a trifle, but uniformly wound spools are essential to uniformly woven wires.

EASTWOOD-NEALLEY CORPORATION • Belleville, N. J.

Although this is the accepted and acknowledged line organization found in several large oil refineries and chemical corporations, it is not appropriate to the most efficient use of instrument manpower. This opinion has been expressed by many writers on the subject. Comstock[1], Kerley[2], and Frost[3], have all held a brief for the benefits derived from removal of the instrument organization from the jurisdiction of unrelated management.

Observations made by the author point up very strongly the advisability of having the whole instrument set-up fall under single line supervision, related as closely as possible to the production or operating department. The most important advantage to the company is the increase in productivity of instrument men resulting from their alliance with people who emphasize product output. To my mind, an automatic controller is an operator and the man responsible for such an item is a part of the operation. You cannot expect to create and maintain enthusism for his work in an employee unless you give him an incentive, a reason for his being there, a feeling that he and his services are important to plant production.

Similarly, the information required by instrument engineering has no important relation to any one except the process design engineer in the chemical oil or food industry. In the paper, steel, glass or other similar industry, a close tie-in with machine design engineers would perhaps be desirable. Wherever possible, the instrument engineering department should report directly to the individual in charge of process or machine design as a whole. It is then automatically maintained up to date on all design changes and has intimate contact with the persons with whom most of the design time is spent. It can correlate its efforts with identical degrees of emphasis throughout the progress of the job. During construction and start-up, it is in a position to collaborate with the operating departments in their effort to prepare for final operation.

Qualifications Desired in An Instrument Engineer

The greatest asset in the make-up of the instrument engineer is his knowledge of measurement and control principles, and his familiarity with the equipment and its applicability. Attainment of such an asset can be reached today, far more readily than at any previous time. Formal programs for the training selection of instrument personnel have been instituted by many instrument users. It is now possible to obtain a technical staff which has absorbed a formal education purposely designed to prepare it for instrument work. This schooling should have been followed by field experience in the manufacture, installation, use and maintenance of instruments in the type of industry concerned. A ten-year background covering these phases should give any prospect all of the preliminary instrument education that he can obtain. His success or failure in engineering duties will depend on his use of common sense, his personality, activity and ambition, and to some extent on the encouragement received from his employer.

A sizeable amount of the work done by an instrument engineering department could very capably be accomplished by the average chemical engineer. His work involves the specification, procurement and installation as an integrated process, a whole variety of machinery and equipment from pipe stills to packing machines. A power plant engineer is equally capable of providing combustion control equipment. He too, handles the engineering on a wide variety of water treatment, combustion, fuel preparation, power generation, switchboard, and power distribution equipment.

The instrument field, however, has become so highly competitive, with widely varying ways of doing the same thing, that a great deal of actual experience is required for conclusive evaluation. As an example, steam pressure may be controlled through a reducing valve operated by any of various mediums. It may use the force generated by steam pressure to position the inner valve. It may also use a steam pilot operated device for this purpose or a bourdon-type presure measurement actuating electrical or pneumatic forces to drive the valve. A pilot may monitor hydraulic forces to piston-actuate the valve or it can use hydraulic pilot means to electrically drive the valve or any of a number of such combinations, each designed to be superior under specific conditions.

This is a fairly straightforward example of the simplest type of instrumentation ordinarily encountered. The more complicated problems of measurement and control will definitely require the undivided attention of an interested and competent engineer. He is in a position to save considerable expense to his employer in many ways.

One illustration within the author's acquaintance involves the provision of a complete control panel by a single vendor on a special application which had been purchased repetitively on several previous occasions. Shortly after the assignment of an instrument engineer to this particular department, a bid was received for another such control system. The job was quoted on the basis of customer specifications and design. The instrument engineer broke it down into several components, obtained quotations by phone on each of these, including one for assembly, and came out with a cost which was $8000 below that of the privileged vendor. This was possible only because the instrument engineer had the time, the interest and the specific ability to substitute dependable alternatives for the overly elabortae items in the vendor's proposal. He has also been forced to make his own decisions concerning many special corrosion problems.

The company's metallurgical experts can readily recommend an alloy material like duriron for pumps, vessels, piping, fittings, etc., but their investigations are limited to process equipment. Thus they cannot quickly give a firm recommendation to the instrument engineer who must find a resistant material which can be drawn, heat treated, welded and fabricated to a complicated and thin-walled mechanism like a bourdon spiral, torque tube, sealing bellows, ball float, or some such equally impossible shape. He checks with the manufacturers regarding their experience in other industries on the possibility of a substitute metal or a sheathing or coating material. Perhaps he has to use an instrument based on a different principle or to change the process to avoid the use of instrument equipment in the corrosive service. As a last resort he may be forced to purge or seal the delicate parts of his instrument with an inert medium available on the plant and not injurious to the process.

Ability to recognize such problems in the early stages of design and to propose adequate solutions will only be possible if familiarity with operating conditions and plant practices is consistently maintained. Necessarily, if plants are to be designed and

equipment purchased through central engineering in the home office, it should follow that instrument engineering can best be accomplished in the same way. A satisfactory job can only result, however, from close co-operation with the field forces and positive recognition of field conditions.

The instrument man is one type of engineer who quickly loses his value if he is not permitted field contact or is not allowed to follow every job through until all items are performing to the satisfaction of everyone concerned. In a field which is so rapidly changing, the man who is permitted to get out of touch with conditions in the plant and the performance of new equipment will be left so far behind that he may never again catch up. This work is so completely diversified that no individual can hope to be self-sufficient. He may do amazingly well if his interest is completely captured and there is an incentive to his pursuit of knowledge with almost fanatical enthusiasm. The instrument engineer has a responsibility out of proportion to the importance attached to his job.

Many processes cannot operate without adequate and dependable automatic control applied correctly, and their success or failure depend to a large degree on the accuracy and sensitivity of properly located measuring devices.

A recent experience indicates the desirability of having competent instrument personnel available for the initial operation of all new process units. This illustration concerns the loss in production of a unit for three weeks plus the expenditure of $5000 in making unnecessary design changes because of a series of erroneous temperature readings caused by insufficient immersion of the measuring element in the thermowell. Such circumstances may or may not occur in the presence of a capable instrument engineer, but when they do they most certainly reflect on his capabilities. Time saved during the initial operation process is of inestimable value, and if any such saving results from the effort of an instrument engineer, then we can truly say that his existence is justified.

Ideal Organization

It has been said that a major factor contributing to the success of one of the large manufacturers in the chemical field has been its attitude toward executives. In this company, a top ranking executive is completely freed from routine duties. He makes no periodic written reports to his management, is not fettered with the necessity for applying signatures to routine correspondence, approval of drawings, etc. His whole attention may be focused on the efficiency of operation of his department, on evaluation of results obtained from their output, on maintenance of a proper perspective of the picture as a whole. He is given time to quietly think through each problem to reach a sound, final decision. This is the type of individual under whom it is desirable that an instrument engineering department be placed. He should have a keen appreciation of the many ramifications of this specialized field and be aware of the pitfalls of inadequate instrument engineering. He should be in a position to direct attention to whatever project commands highest priority, and be empowered to adjust manpower to suit variations in work load.

The instrument engineering department should have a basic strength suited to the average construction program. It would be built around an outstanding instrument authority having executive ability. He should be provided with trained stenographic and clerical assistance, selected drafting personnel, competent instrument engineering assistance, plenty of space, an ample library, a library service where he will receive abstracts of pertinent literature, an index of such abstracts, access to an instrument test laboratory where equipment may be evaluated at his direction, or special adaptations of standard equipment made. He should have jurisdiction over the activity of a special research laboratory devoted to the development of equipment not available from manufacturers and which is only necessitated by the requirements of his employer's particular industry, especially those offering possibilities for process improvement over outside competition.

Ground Water's Role in Power Production*

M. W. KYLER, Manager
Wisconsin Valley Improvement Company

A great source of water, which in quantity many times dwarfs surface supplies created by man, is now under intense study. It is the vast hidden reservoir of ground water. One outstanding case, in the vicinity of Los Angeles, California, is composed of a series of aquifers isolated by lava dikes. The aquifers are pumped intensively and recharged from surface runoff. Precise stage-capacity curves have been developed to aid in the operations of withdrawal from these storages.

Another instance, is the work done on the Susquehanna River drainage area. There the relationship between water table elevation and base stream flow has been defined to the extent that accurate forecasts of stream flow can be made for periods of four to eight weeks, following a determination of the water table index. By knowing the minimum flows to be expected, scheduling of steam plant maintenance can be definite because it will be known whether or not certain units will be needed. Also, coal requirements can be anticipated by knowing how much steam generating capacity will be required to meet demands.

In the Wisconsin River drainage area, 17 wells were installed to measure ground water fluctuations in 1942 and 1944.

Wells located in the northern lake area and on the east side of the Wisconsin River behave very much alike, but wells located in the tight Colby silt loam on the west side of the river behave as if they were located in a perched water table. Their minimum is about the same, regardless of the severity of the drought conditions, and they quickly reflect any water received. This indicates they tap a low capacity storage. The other wells do not fluctuate so wildly and reflect varying degrees of precipitation deficiency or abundance. In computing the average ground water level, the better wells have been used, which seems to reflect the large general ground water storage and not the low capacity storage in the tight soils. The ground water condition is plotted as an average departure from the initial level at the start of the program.

On the graph, good correlation is noted between stream flow, power generation, precipitation surpluses or deficiencies, and the ground water level. As the ground water has fallen, subsequent power generation and stream flow have noticeably dropped. Of course some of the drop in flow and generation is due directly to less

*Abridged from paper presented at Northwestern Division of the American Pulp and Paper Mill Superintendents' Association, held in Merrill, Wisconsin, September 24.

(Turn to page 1540)

COLORS . . .
for Board and Paper
Green Chromium Oxides
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FOUNDED 1915

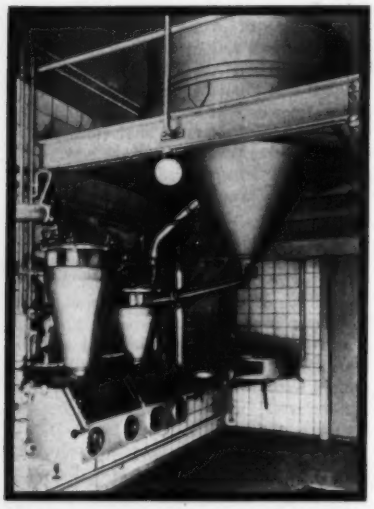
NEW EQUIPMENT AND SUPPLIES

Spraying Equipment of Danish Design

Spray drying equipment of well known Danish design is now available in this country through Niro Corporation, an American firm that recently opened offices at 52 Broadway, New York City.

Niro's office staff includes designers and construction engineers trained at Copenhagen who will produce spray drying plants in this country under rights from the Danish originators, Niro Atomizer, Ltd. The drying processes of the European firm long have been familiar to American manufacturers.

An outstanding feature of the Niro method is the atomizer head. This is a specially designed, high-speed rotary head



which ejects the liquid product as a mist into the drying chamber. Circulating hot air seizes the mist as it enters the chamber and instantaneously evaporates its water content. The dry content falls to the bottom of the chamber as a fine powder and is funnelled out as a finished, easily soluble product ready for packaging and sale.

Trouble-free operation is a result of the equipment's two-stage design. Pipes, ducts, or other parts of the system do not clog even when drying viscous substances of pastry structure or under other severe working conditions. One person is sufficient for attendance of an entire plant.

The company claims that its system may bring about important simplification of production methods in the processing of paper and paper products. Chemical experiments and spray drying trials in the planning of new productions may be undertaken in the research and experimental laboratory.

Nylon Filter Cloths

Tailored to fit any make of rotary vacuum or pressure filter or filter press, are the new nylon filter cloths available from the Filtration Engineers Inc., 155 Oraton St., Newark 4, N. J.

These nylon cloths are resistant to acids, alkalies, and bacterial action. In many severe cases they will last many times the life of previously used cotton fabrics. The synthetic cloths are easy to clean, and are woven to give the best possible combination of filtering qualities with maximum life and minimum blinding or plugging up.

Single Control Valve Is Now Part of Equipment on Cochrane Zeolite Systems

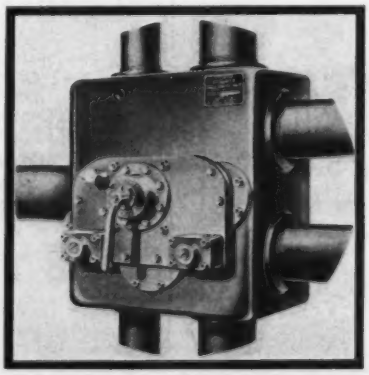
A single control valve for the simplified operation of all type of zeolite softeners, ion exchange systems, and pressure filters promises to reduce time required by the plant operator, and minimize the possibility of faulty operation through error in manipulation. This is the *Hydromatic* single control valve, recently announced by the Cochrane Corp., 17th St. & Allegheny Ave., Philadelphia 32, Pa., as standard equipment on its line of zeolite softeners and pressure filters.

Control of backwash, rinse, service, chemical feed, etc., is greatly simplified. With the Hydromatic valve, all necessary operations are accommodated by means of a single valve. In addition to integrating the functions normally performed by a valve nest, this valve also incorporates such features as built-in-backwash and rinse rate controllers, which further reduce space requirements and attention required by operating personnel. The Hydromatic valve is, in effect, a six-position valve, with four normal operating positions and two standby positions.

In the control of zeolite systems, the four operating positions provide separate control of backwash, regenerant feed, rinse and service, permitting great flexibility, so that separate flow rates may be assigned to each operation, unaffected by the requirements for other phases of operation.

In the control of pressure filters, in the majority of cases, only three operating positions are essential; for control of backwash, rinse and service. However, a fourth position is provided for actuating such devices as a filter agitator or a filter aid or precoat type of chemical feed.

Two standby positions are accommodated by this valve: in one, the container being serviced by the valve is completely isolated from service lines; in the second, the container may be drained to bed level for inspection. Operation of the Hydromatic valve through its cycle of functions has been so



simplified as to make it ideally suited to manual or automatic control.

The Hydromatic valve is pilot-actuated, power for operation of the valve members being provided by the raw water itself. This results in smooth operation and confines the force required for positioning—either manual or automatic—to a miniature disc-type pilot valve. Further, this permits gradual opening and closing of the valve members, completely eliminating hydraulic shock with its attendant disruption of the bed within the container. Since gradual motion of the valve members in passing from one sequence to the next is inherent in the Hydromatic valve, close attention by the operator is not required and damage due to careless operation is eliminated.

Heavy-Duty Die Cutting Press for Paper Product

A completely new hydraulically operated, remote control, 60-inch heavy-duty die cutting press is announced by the Standard Machinery Co., of Mystic, Conn.

A versatile machine, now being used in the manufacture of various paper products, finger tip pressure permits the operator to

move a hydraulic operated lever, which is conveniently located alongside the front roll. The lever operates the friction disc clutch and a large rugged brake.

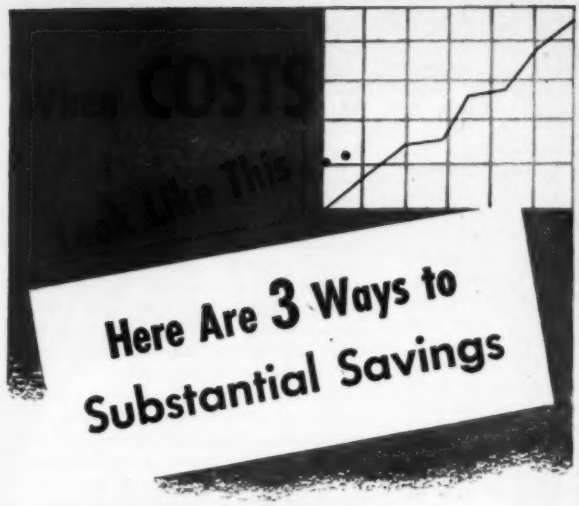
With complete lever control of the press at all times, the operator can easily jog the head in up and down positions, or operate the machine continuously or intermittently.

Compact, sturdily built, neat appearing, and completely safe (all moving parts, except the head, are enclosed), the new 34-in x 60-in die cutting press is capable of operating at 15 strokes per minute. The oversize clutch and brake permit instantaneous start and stop operation.

"Dry" Plating Process

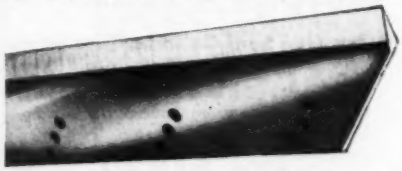
A process of metal plating by means of a gaseous medium has been developed by the Commonwealth Engineering Company, Dayton, Ohio.

Heat is the sole means of deposition in the Commonwealth gas plating process, which involves the thermal decomposition of metal carbonyls in a completely inactive



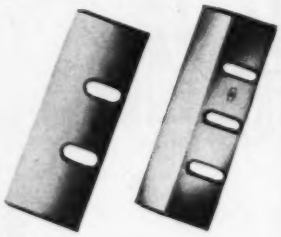
Here Are 3 Ways to Substantial Savings

● ATKINS PAPER KNIVES



Records prove that Atkins Paper Knives frequently give two to three times the service between grindings. Made of special analysis steel, specially heat-treated — then ground and honed to razor-keeness — Atkins not only stay in the cutter longer, but deliver consistently cleaner, smoother cuts throughout this extra cutting period.

● ATKINS CHIPPER KNIVES



Heat treated, hardened, tempered and ground to give you uniform, unbruised chips *without frequent grinding and with fewer knife replacements.* Atkins Chipper Knives save you money two ways. by producing better chips for longer periods; by holding knife costs to a minimum.

● ATKINS RULE

Up to 350,000 impressions reported on tough stock with absolute uniformity. Easy to work, always the same in height, temper, thickness. All types—cutting, perforating, creasing — in all sizes.

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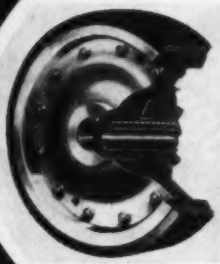

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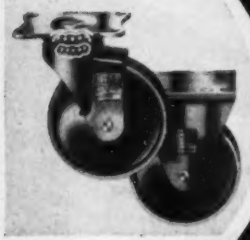

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atmosphere filled with carbon dioxide.

Objects to be plated are radiant-heated in a plating chamber supplied by a metal carbonyl generator, in a closed system which recycles the plating gases for economy of operation.

An integral metal coating is quickly obtained at temperatures of approximately 400 fahr., and the "dry" process is applicable to any material which will withstand this temperature range.

Rate of uniform deposition is far higher than that of conventional electroplating, and irregular surfaces, complex shapes, and articles with internal areas are readily handled.

The process is ideally suited to the continuous plating of strip moving at fairly high speeds. In a laboratory test operation utilizing a small experimental unit, 13 pounds, 6 ounces of nickel was deposited in a 60 minute, single-pass plating cycle. In another operation on continuous strip an amount of metal which would have required 30 minutes to apply by conventional plating methods was deposited in four seconds.

Thus a web of fine, hard paper moving at a substantial speed can be coated readily by the gas plating method, opening up new possibilities for the production of foil laminates, can-making materials and condenser papers.

Metal strip likewise may be gas plated at high speed without the high heat requirements and extensive equipment required by conventional thermomechanical methods.

Carbonyls of a number of metals, including nickel, iron, chromium, tungsten and molybdenum, may be used in the process.

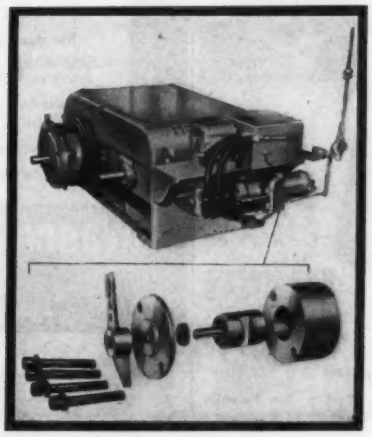
Surface preparation for gas plating is the same as for electrolytic plating.

Control of the process is relatively simple, however, without the complicating factors of complex baths, delicate solution balances and intricate electrodes presently involved in wet plating.

Rotary Valve for Hydraulic Controls

A new, rotary-type valve to provide maximum efficiency of hydraulic controls for Reeves variable speed transmission is now available from the Reeves Pulley Co., Columbus, Ind.

This valve is an exclusive feature of the Reeves hydraulic control which, applied to the transmission, permits entirely automatic speed regulation for synchronization of different machines and separate sections of a single machine; maintenance of control tension and uniform peripheral winding speeds; and maintenance of uniform pressure, weight, liquid level, temperature and other variable elements.

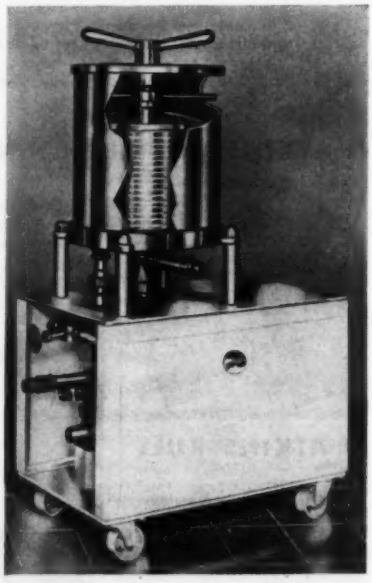


Extremely simple in design and with few moving parts to wear, the valve is actuated with only four-ounces pressure. Its stem is mounted on ball bearings to assure smooth operation, with minimum friction or "drag." Because of its rotary design, eliminating lateral motion of the stem, the new Reeves valve can use, to full advantage, a tight-fitting, cup-type oil seal which prevents oil leakage around the valve stem.

The new rotary type valve is being installed on all new Reeves variable speed transmissions, replacing the stem-type valve previously used. It also is available for replacement on transmissions now in service. Only two sizes of valves are required to fit all Reeves transmissions using hydraulic controls.

Positive Seal Cylinder Disc Filter

Development of a new Positive Seal cylinder type disc filter to be known as model ECD, was announced by the Ertel Engineering Corp., Kingston, N. Y. It incorporates a new principle of double



closure to insure a positive seal. The filtering elements are independently tightened from the cylinder. This method permits the use of various types of rigid filter media in any number up to the rated capacity of the filter. After the filtering elements are sealed the outer cylinder is independently closed by a separate handwheel.

Due to the double closure there is no loss of liquid because of evaporation or drippage, a feature which makes the filter adaptable for handling volatile liquids. Since the filter effects a positive seal between the filter medium and the inlet and outlet channels, the danger of by-passing unfiltered liquid is eliminated.

The filter is arranged to make reloading and cleaning as simple as possible. By re-

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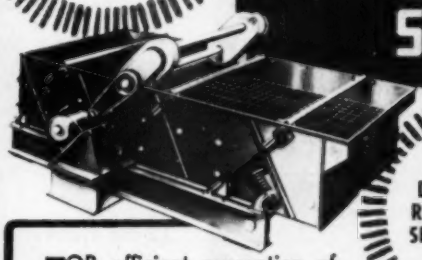

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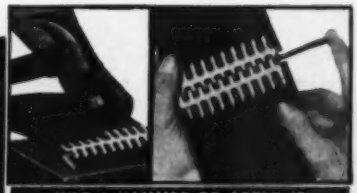

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By using Flexco HD Rip Plates, damaged conveyor belting can be returned to satisfactory service. The extra length gives a long grip on edges of rip or patch. Flexco Tools and Rip Plate Tool are used. For complete information ask for Bulletin F-100.

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moving the head and the cylinder the entire unit is exposed. Standard inlet rings can be substituted for wider inlet rings when it is necessary to absorb considerable amounts of solids. For greater capacity filtration, multiple units are recommended.

Plastic Safety Goggle

A new all-purpose safety goggle known as *Saf-I-Shield* is being introduced by the United States Safety Service, 1215 McGee St., Kansas City 6, Mo.

This safety goggle is made of Optilite, a new optical safety plastic developed and improved by more than six years of in-

tensive research. This goggle meets strict government specifications for impact and piercing resistance as well as optical qualities.

It can be used wherever a safety goggle is needed with complete assurance that it offers the maximum in eye protection. It also will fit over prescription glasses affording protection to those needing corrected vision. Saf-I-Shield is available in three different models.

Paper Roll Handling Truck

Designed to overcome many of the problems involved in the hand-trucking of 1500 to 3000-lb rolls of paper, a new paper roll truck was recently announced by the Melooz Manufacturing Co., 4730 Avalon Blvd., Los Angeles 11, Calif. This truck incorporates unique balancing and leverage features which greatly reduce the time and effort required to handle these massive rolls.

This truck utilizes an instantly adjustable tripod support which balances and carries the entire weight of the loaded roll. After the roll is loaded, the operator carries no weight, but merely pushes or pulls it to its destination. The telescoping support is controlled by a foolproof, finger-operated ratchet mechanism which provides 11 positions in which the truck can be tilted and locked. The right balance position is provided for every weight and type of roll now being handled, or likely to be available in the future.

A leverage plate, extending over and beyond the third wheel, provides a safe, foot-operated lever which more than doubles the operator's strength in breaking the roll back. Once broken back, the balance is so calculated that one man easily brings the roll down to wheeling position. The same balance makes it possible for a vigorous one-hand push to unload the roll from the truck, thereby saving time and labor.

Upper and lower contoured steel yokes are provided to balance and cradle the roll during wheeling. The upper yoke acts as a spring to absorb loading shock. The lower yoke protects the bottom of the roll from damage.

12-hp Heavy-Duty Saw

Important innovations aimed at meeting the needs of the world's heavy timber cutters are features in the new Disston heavy duty *Two-Man Chain Saw* announced by Henry Disston & Sons, Inc., of Tacony, Philadelphia, Pennsylvania.

The new rugged 12-hp chain saw conquers easily the difficult job of cutting wet, frozen, or hard wood. A lightweight Mercury gasoline engine, with full precision bearing construction throughout, gives the operator increased performance and lower maintenance costs.

The transmission housing is of a new extra-strong design with reinforcing ribs added to absorb the shocks of cutting. The important abutment plate has a new shape which prevents the engine from pullting under the log as the cut is completed.

Also of interest, is an automatic chain lubricator which requires no control on the part of the operator. In all cutting positions this powerful pump sprays the chain with lubricant, guarding both the chain and rail from the ravages of friction. Clogproof, it shuts off when the chain stops. A new flexible fuel pickup inside the oil chamber is the secret of its claim to "any-angle" oiling perfection.

A quick-detachable tail stock of strong aluminum alloy construction has been added. The Disston steel guide rail has been modi-

fied also to allow for its speedy removal from either the engine or the tail stock end. Chain tensioning has been simplified and is now variable for all types of cutting. The carburetor and the magneto are mounted underneath the unit, for protection against falling limbs. The fuel tank and fan housing are of tough aluminum alloy construction. All dirt and grit are removed from air entering the engine by an air filter made of two replaceable paper elements. A cutting chain, made of the same steel used in Disston hand saws, is an important part of the saw's success in the field.

Ground Water's Role in Power Production

(Continued from page 1535)

surface runoff. In some areas, the terrain is of such a nature that the ground water contribution to flow is only a small percentage of the total runoff. This would be true in a tight soil of a rugged terrain. In the more loose soils of a flatter terrain, the ground water flow affords a larger percentage of the total.

It appears that a high ground water does indicate good stream flow and, therefore, good hydro-generation. Direct forecasting of stream flow or hydrogeneration from ground water level only, must be always modified by the realization that any variation in precipitation will greatly affect the forecast because of the resultant surface runoff. As an example, the ground water level in June of 1945, would indicate that stream flow following would he less than the same period in 1943. Such a deficiency actually resulted during July and August. But surplus August rains completely changed the picture and resulted in much better fall flows than would have occurred with normal rain. Excessive November precipitation in 1945 further increased the flows during the following winter.

A normal amount of rain was well spread over 1943. The ground water hydrograph shows that it gained very well from good spring rains. The power production resulting from good distribution or rainfall after July can be compared to the good position in June, coupled with poor summer and fall rains is reflected in the low stream flow and electrical generation for that year.

In July of 1946, the ground water table was at the same position as the summer of 1943. It is strikingly indicated on the graph how copious precipitation in September, October and November prevented it from receding rapidly. Poor winter and spring precipitation, however, prevented its proper recharge in 1947.

It can be said safely, that with normal or less than normal rains, this next year, reliance on steam to supplant the loss in hydrocapacity will be great. If no more than normal rains occur, coal consumption will be equal to, or greater than, 1947.

Intense careful comparison of stream flow, surface run off, evaporation, ice formation and ground water fluctuation must be made before precise quantitive forecasting of base flows can be hoped for. As yet, only general comparisons can be made as cited above. However, they are of definite value. The record does indicate definitely that 1948 and 1949 will be worse in hydroelectric shortage than 1947 if abundant continued rain is not received. This in turn, points the way to more dependence on steam and the attendant greater use of coal to make up the difference.

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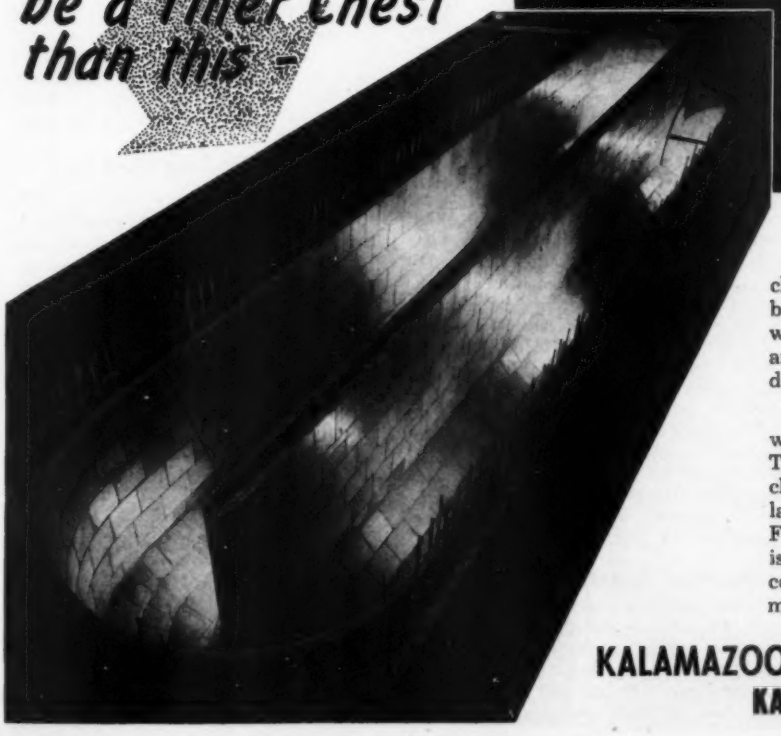

Here is a Kalamazoo Glazed Tile chest in process of construction. It is built of smooth, Kalamazoo Glazed tile with a solid, reinforced concrete core and designed for the installation of deckers on top.

Tanks can be made to any design with sloping floors and rounded corners. The ideal material for stock tanks or chests because of its permanent, long-lasting, easy-to-keep clean surface. Far superior to concrete because there is no chipping or flaking. Standard construction in most modern paper mills.

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TECHNICAL DEVELOPMENTS

These abstracts are of the latest developments found in American and foreign press.

Standardization of Reducing Values of Sulphite Waste Liquors

The Bertrand method for determining the reducing sugars in sulphite waste liquors or in prehydrolyzates when subjected to slight modification gave fluctuating results. In studying this method the authors varied the following: cupric sulphate, alkali and tartrate concentrations in the standard solutions; the glucose used as standard, the temperature at which the reduction was carried out, and the lignin contents of the liquor.

The following standard procedure is suggested: the liquors are diluted until they contain about 40 mg. of reducing substances (calculated as glucose) per cc. after a preliminary proximate analysis. The solutions used were (I) containing 60 g. crystalline cupric sulphate per liter, (II) containing 100 g. caustic soda and 200 g. potassium sodium tartrate per liter and (III) containing 50 g. ferric sulphate and 110 cc. concentrated sulphuric acid per liter. Ten cc. of the diluted solution to be analyzed were treated with 20 cc. each of (I) and (II) and the mixture boiled gently for three mins., filtered through a 3G4 fritted glass crucible, and the precipitate thoroughly washed and dissolved in 20 cc. III containing 1-2 drops of dilute permanganate solution. Subsequently three drops of "ferroin" were added and the mixture was titrated to a sharp pale blue end point with 0.1 *N* permanganate.

The factor (which was shown to vary slightly with the concentration of the reducing substances) is taken as 3.14 mg. glucose per cc. of potassium permanganate. If the waste liquor was fermented, the initial dilution was omitted. Removal of lignin derivatives prior to the determination is not required. K. Schwabe and E. Hahn. Papier-Fabr. Wochbl. Papierfabr. No. 11,351 (1944) (In German).

Sulphoethylcellulose from Pulp

Using a bleached sulphite pulp containing 94.1% alpha-cellulose, the author mercerized this material with 28 per cent caustic soda for two hours and pressed it to a ratio of 3 : 1. The shredded alkali-cellulose was then condensed with sodium chloroethyl sulphonate ($ClCH_2CH_2SO_3Na$) at 54 deg. under nitrogen. The preparation of this reagent and its bromine and iodine analogs is given. In general the degree of substitution was about 0.38 (i.e. 0.38 mole of the reactant per glucose unit). The free acid (i.e. sulphoethyl cellulose, or "cellulose ethanesulphonic acid") was formed by passing the viscous aqueous solution of the sodium salt through a suitable cation exchanger. The acid is white, hygroscopic and water soluble.

This water solubility is also manifested by the iron, calcium and aluminum salts. The free acid is considerably stronger than acetic acid or than the acid group of carboxymethyl cellulose. The author gives in great detail the conditions of reaction (*i.e.* the ratio of pulp to etherifying reagent, cellulose to alkali, and to water, and the influence of time, temperature, and halogen in the alkylating agent used). The reaction appears to be permutoidal (not micellar heterogeneous). No uses of the compound are given. Twenty-four references. Tore Timell. *Svensk Papperstidn.* **51,** No. 11,254 (1948) (In English).

Continuous Regeneration of Waste Paper

With the idea of helping to relieve the paper shortage in Germany, the author describes in detail various operations that may be used in regenerating waste continuously. Before its comminution, the dry paper is run over a conveyer belt made of coarse wire netting which permits the removal of obvious impurities. The paper is then taken to a shredder consisting of a rapidly rotating drum provided with a series of heavy projecting spines, operating within a fixed shell also carrying spines. This drum is so sturdy that it is not affected by heavy impurities like wire or bones which have escaped the first cleaning stage. Some of the lighter impurities are removed by suction through a special blower into a dust chamber.

The paper is then fed into a slow-moving conical screen drum provided with string catchers. This is followed by a movable suction installation to separate the lighter paper from other heavier impurities. From this the paper is conveyed over a cyclone separator to a storage chest. It is then wet down and fed by an endless screw into a special breaker beater. The defibering action is mild and power consumption is kept at the minimum. The stock is then pumped to a vibrating flat screen whence it flows to a riffler.

The current of the stock (which is at 0.5 to 1% consistency) is very slow to allow further settling of impurities. For the further removal of floating particles like cork or rubber a centrifugal screen is used. Stock treated as above is clean enough for medium grade writing paper, file cards, etc. The stock is then thickened and fed to a suitable beater where it is treated with fillers, size, alum, dyes, etc., and then passes to the machine.

The white water from the paper machine and thickeners is reused. Broke from the wet end of the paper machine is collected in a chest under the couch roll and returned to the process. E. G. Drautz. *Wochbl Papierfabr.* **76,** 239 (1948) (In German).

Adsorption Agents in Packing

When packaging materials cannot be conveniently or economically sealed against moisture, certain adsorbing agents may be used to protect the package. Two which are described are silica gel and activated alumina, both of which take up moisture readily. Formulas are given for computing the amounts of these adsorbents to be used under specified conditions. The article includes two charts which show (1) the relation between equilibrium pressures, silica gel temp. and the adsorptive capacity of a specific gel and (2) the adsorption of water vapor by activated alumina at 20 deg. C. A. E. Williams. *Brit. Packer* **10,** No. 9, 18 (1948); through *B. I. Paper Chem. 19.* 156 (1948).

Proper Selection of Fourdrinier Wires

The factors which exert an influence on the efficiency of the fourdrinier wire as a sheet-forming and dewatering medium are discussed. These discussions include methods of weaving, thickness of the individual weft and warp wires and the density of the woven product. An important requirement is the non-marking of the finished sheet. Wire marks are chiefly caused by protruding knuckles of the warp wires which should always be ground off on the top side. Finer wires are less apt to mark, but are more easily damaged and have a shorter life span.

A numerical analysis of the water removal from the stock was made from the passage from the wet end over the succeeding sections until it emerges from the dryers as the finished sheet. About 96.8% of the total water is removed on the wire. About 2.2% is lost on the wet presses and about 1% is evaporated in the dryers. This relationship varies somewhat with the grade of paper, but by far the greatest part of the water is always lost on the wire.

The author discusses those wires that are most suited for the production of specific papers, which range from printing paper to cigarette and condenser papers.

When various grades of paper have to be made on the same machine, and both free and slow stocks are used, compromises must be made in the selection of the Fourdrinier wires. Experimentation is necessary and furthermore the advice of wire manufacturers must be sought. K. Keim. *Wochbl. Papierfabr.* **76,** 235 (1948) (In German).

Manganese in Pulp Used for Viscose

Manganese that is found in pulp could be traced back to the original wood and more specifically to the ray cells, which gave rise to finestuff (mucilage). When the rays were removed, the manganese content was greatly reduced, especially when the finestuff was separated from *unbleached* stock. The so-called finestuff in *bleached* pulps is different from that mentioned above and is derived largely from broken tracheids which contain only traces of manganese. The manganese in pulp evidently has an effect on the aging process in the manufacture of viscose.

In a pulp with a degree of polymerization of 972 which was aged at 25 degrees, it was shown that manganese acted as a catalyst in reducing the degree of polymerization. Thus while 0.1 mg of manganese per 100 g. pulp had very little effect, catalytic effects were noted when the manganese content rose to 0.28 mg/100 g. F. Wultsch. *Papier-Fabr. Wochbl Papierfabr.* No. 11, 354 (1944) (In German).

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No. GL-2, illustrated, is an all-purpose, heavy duty machine that is adaptable to any type laminates required. The open design construction permits easy installation of varied applicators for pastes, glues, waxes or asphalts. Assemblies may be rearranged, new ones added or subtracted, according to sheet leads required. Write for complete detailed information.

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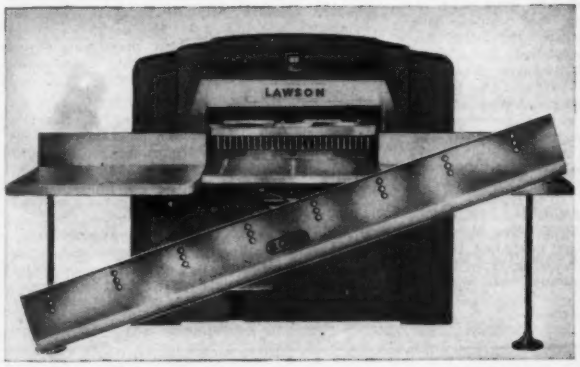

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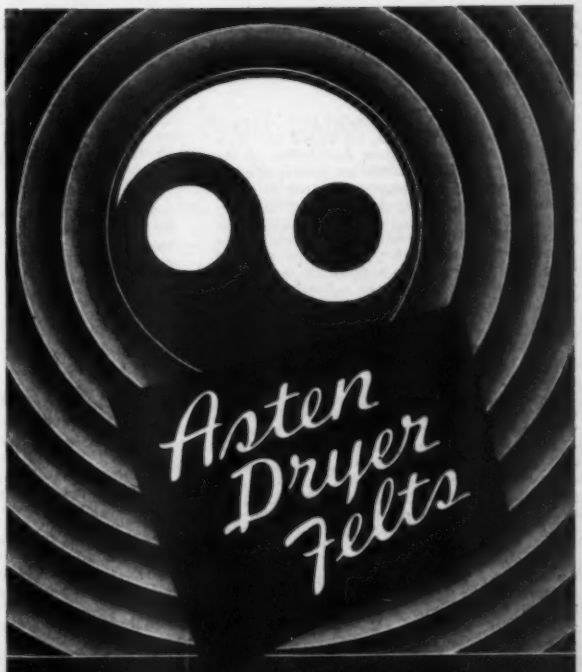

Asten Dryer Felts

ASTEN-HILL MFG. CO., PHILADELPHIA
ASTEN-HILL LTD., VALLEYFIELD, QUE.

New Catalogues and Publications

Acme Steel Company, 2840 Archer Ave., Chicago 8, Ill.—Valuable information on reducing damage to shipments by the use of Acme Steelstrap is contained in Issue Number 22 of the Acme Process News. Booklet may be had by writing to the above address.

Allis-Chalmers Mfg. Co., S. 70th St., Milwaukee 1, Wis.—Three new bulletins have been released by this company. The 16-page Bulletin 11B6285A, "How Power at Load Centers Pays Off," describes the power savings, better performance, greater safety and flexibility, easier installation and quicker delivery possible with the new standardized load center substations. Included is a simple nomogram for selection of the correct air circuit breaker for any application of a standardized load center unit substation. Also a 16-page booklet is No. 25B7095, "Switchgear and Control Devices." Effectively illustrated descriptions combined with types and ratings on the various equipment; standard wiring diagrams and photos of typical station combinations, accompany data on push button stations. The third release is a leaflet, Bulletin 61B6043A, which covers "Transformers With Chlorextol Fireproof Insulating Liquid." All of these may be obtained from the company as listed above.

American Cyanamid Company, 30 Rockefeller Plaza, New York 20, N. Y.—Just issued by this company is a new 17-page technical bulletin, "Azite Liquefier 900." It includes the chemical and physical properties of the product and test data on its use in start solutions; in protein adhesives and sizes; for paper coatings and for improving permanence and heat stability of papers containing acidic constituents. Available free of charge.

Bostitch, 302 Mechanic St., Westerly, R. I.—A booklet just released by this company, "Time and Money Saving Case Histories," is interesting and informative. It is filled with brief stories of customer experience and has marginal illustrations showing various applications. Requests for copies should be addressed to S. L. Smith, advertising manager, at the above address.

Cyclotherm Corporation, 90 Broad St., New York 4, N. Y.—A complete description of the operating principles and design characteristics of their automatic steam generators is given in Bulletin P-1 recently published by this company. The booklet includes diagrammatic sketches, construction details, performance data and standard ratings for both steam and hot water generators in sizes from 10 to 300 hp. Copies may be obtained by writing to Dept. 165-R of this company.

Detroit Stoker Co., R. 5-127 General Motors Bldg., Detroit 2, Michigan.—A catalogue with a golden cover is devoted to the design, operation and application of this company's Roto-Grate Stoker. The book is issued in connection with the company's 50th anniversary year and is a pictorial treatment of the subject. There are 42 pages with a large number of blueprints in color. Applications in industrial plants and public buildings are illustrated, including a number of paper mills.

Dings Magnetic Separator Co., 4740 W. McGeogh Ave., Milwaukee 14, Wis.—Of special interest to pulp and paper makers is Catalogue No. 301-A, on Triple Pole Magnets, which is available upon request. It illustrates the use of various types of rectangular magnets and their advantages, including the application of such magnets after pulp washing.

Dow Corning Corp., Midland, Mich.—A new technical publication is "DC Silicone Fluids, Dow Corning Notebook, Fluid Series No. 3," now available. It contains comprehensive material on the properties and behavior of the DC 200 Silicone Fluids, including tables and graphs.

Downingtown Manufacturing Co., Downingtown, Pa.—In Catalogue No. 848, "Downingtown-Wiener Stock Regulating Valves," these valves are fully described. Sectional drawings and standard dimension charts are included.

Lebanon Steel Foundry, Lebanon, Pa.—A new 12-page illustrated bulletin, "Centri-Dri Castings," gives detailed information on the Centri-Dri process of centrifugal casting in permanent molds. The bulletin is intended for a data reference source for executives, engineers and designers. The process is considered to offer significant possibilities for the production of the circular shapes required by the paper and pulp industries.

Leeds & Northrup Co., 4934 Stenton Ave., Philadelphia 44, Pa.—Listed for the first time in one publication, is their complete line of strip-chart Micromax recorders and controllers for measuring a wide variety of process variables. The 32-page booklet is illustrated and has complete specifications in tabular form. Ask for Catalogue ND44 (1), "Micromax Model S—Indicating Recorders and Controllers."

Liquid Conditioning Corp., 114 E. Price St., Linden, N. J.—Of interest to paper mill executives and engineers concerned with water treatment, is a brochure which has just been published by this company. It outlines the background, facilities, processes and equipment offered by the company in the fields of water treatment and the conditioning of other liquids. It lists references to technical articles covering developments in these fields which have been written by technical executives of the company. Reprints of many of these articles are available upon request. Illustrations show plant facilities and installations of various types of Liquon equipment. Requests for this booklet should be made on company letterheads.

Mead Sales Co., 230 Park Ave., New York 17, N. Y.—Now available from this company is a book, "Planning the Modern Municipal Report." It is 8½ x 11, has 44 pages and a cover with plastic binding. This profusely illustrated booklet has half tones of town and city reports from all sections of the country. Also included are the best graphs and charts showing ideas on how financial and progress statements can be effectively pictured. Address requests to the Advertising Department.

Metallizing Engineering Co., Inc., 38-14 30th St., Long Island City 1, N. Y.—The November issue of the "Meteo News" published by this company, shows how metallizing saves money in the maintenance of pumps. Ask for Vol. 4, No. 5.

Modern Packaging Magazine, 122 E. 42nd St., New York 17, N. Y.—A new 32-page market data study, entitled, "The Packaging Market and How to Reach It," has just been released. It is the first part of an analysis of the packaging market. It defines packaging; contains valuable information on materials and supplies; machines and equipment; containers and services used in packaging. It also has statistical information showing quantities of raw materials and finished products consumed by companies engaged in packaging operations.

Norma-Hoffman Bearings Corp., Stamford, Conn.—Just released is a new booklet on this company's "Cartridge" ball bearing. In its 28 illustrated pages are described the many applications of this versatile bearing. Dimensional data, load rating, dirt protection, grease types, content and retention are also discussed.

Rapids-Standard Co., Inc., 342 Rapistan Bldg., Grand Rapids, Mich.—A new four-page two-color bulletin issued by this company contains a complete presentation of their line of floor trucks, including photographs, descriptions and specifications. The specification tables list platform sizes, model numbers, types of wheels and casters used, carrying capacities and weights. Also available from this company is a similar bulletin, No. FV-48, descriptive of their Floor-Veyor interfloor escalator-type power belt conveyor. Belt widths and types, available motors and other specifications are listed.

Timber Engineering Co., 1319-18th St., N. W., Washington 6, D. C.—A pamphlet with full information on their research facilities for the lumber and woodworking industries is available from this company. Among the fields of research in which they engage is the chemical utilization of wood, including pulping, and development of synthetic resins.

Tweco Products Co., P. O. Box 666, Wichita 1, Kans.—In their Form No. 7, Twecolog, just issued by this company, is up-to-date information on their full line of cable connections for electric welding. Price schedule and parts information are included. The booklet contains valuable information about maintenance and care of electric welding cables, connections, grounds and holders.

Wheelco Instruments Co., 847 W. Harrison St., Chicago 7, Ill.—Released by this company is a complete new "Thermocouple Manual, Bulletin T/C 7." This 40-page illustrated manual provides information on selection of proper thermocouples and protecting tubes; methods of checking thermocouples and pyrometers, and installation data. It also lists current prices. Temperature-millivolt curves, resistance tables, pipe and wire sizes and lead wire conduit capacity, are furnished in short form in a separate section of the book.

Books

Small Business: Its Place and Problems—This work is the result of a research study conducted by the Committee for Economic Development. It is authored by A. D. H. Kaplan, who has an outstanding record of achievement in the fields of economics and business education; since 1945 he has been senior staff member at the Brookings Institution. He is the author of an earlier CED research report, "The Liquidation of War Production." Mr. Kaplan also served as consultant from the Bureau of Labor Statistics to the Social Security Board and economist to the Committee on Postwar Economic Policy and Planning, House of Representatives. This absorbing study provides a rich background of figures and fact on every aspect of small business: number of firms and employees, volume of business, areas and distribution, life span and mortality rates, relative efficiency, profit comparisons, and many others. The effectiveness and opportunities of the small business in competition are examined and popular proposals to aid small business are objectively appraised. The policy issues are clarified without being distorted by oversimplification. There is a complete index of contents. The book is available from McGraw Hill Book Company, New York City; price $3.25.

Glossary of Packaging Terms—This compilation of standard definitions of trade terms customarily used in the packaging field, is said to be the first book of its kind. It is put out by the Packaging Institute, Inc., New York. The 192-page volume is composed of 18 basic sections and the terms are alphabetically arranged within each section. Separate sections are devoted to adhesive bags, barrels, boxes, cartons, cans, carloading, closures, drums, flexible packaging materials, glass containers, interior packaging methods, labels, packaging machinery, paper used in packaging, shipping containers, and collapsible tubes. The Glossary was compiled and edited by Gerry O. Manypenny, managing editor of "Packaging Parade" magazine, who is chairman of the Institute's packaging glossary subcommittee. The book is 5½ x 8½ inches; it has a red plastic coated cover and is spirally bound. Copies are available from Packaging Institute, Inc., Publications Dept., 342 Madison Avenue, New York 17, N. Y. Price $2.75 per copy.

Back for More

At the end of the late war, one large newsprint concern had two Bauer Pulpers operating on screen rejects in two of its mills. Today those two mills have a total of 10 machines, and five additional Bauers have been ordered for a third mill. *Back for more.* These machines were purchased with a first-hand knowledge of what their returns would be. The extra quality of the fiber produced gives them a better sheet and each Pulper is turning out several hundred dollars' worth of valuable pulp each day from screenings.

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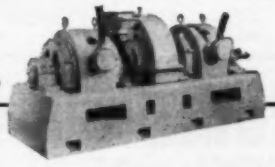

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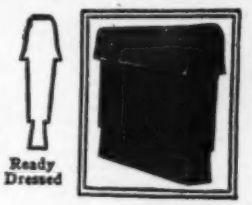

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How clean felts save steam . . . boost paper output

IT costs you less to absorb water on the rolls than it does to evaporate it. The more absorptive your felts, the less steam your driers take. And the cleaner your felts, the lower the cost of your sheets.

Many mills use specially designed Oakite Felt-Washing Compounds to get clean, highly absorbent felts. Providing light suds, wetting and penetrating action, these highly active Oakite felt-washing materials loosen residue for quick removal. And the dirt doesn't re-deposit thanks to free-rinsability of Oakite Felt-Washing Compounds. Properly cleaned, your felts absorb more water, take a load off your driers, help get you more tonnage at the winders—good points to remember.

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CURRENT MARKET QUOTATIONS

RAGS (Domestic)

NEW RAGS

Quotations to consuming mills, cents per pound or dollars per hundred pounds, f.o.b. New York, follow:

	per cwt.
Blue Overalls	7.75 to 8.00
Corduroy, Men's	6.00 to 6.25
Corduroy, Ladies'	6.00 to 6.25
Washables, No. 1	4.75 to 5.00
Percales	7.00 to 7.25
Light Prints, No 1	6.75 to 7.00
Khaki Cuttings—	
Bleachable	6.25 to 6.50
Unbleachable	5.50 to 5.75
New White Canvas	11.50 to 12.00
New Mixed Blacks	5.25 to 5.50
Canton Flannels, Bleached	10.75 to 11.25
Shirt Cuttings—	
New White No. 1	11.00 to 11.50
White Shrunk	10.00 to 10.50
Silesias No. 1	8.50 to 9.00
New Unbleached	11.25 to 11.75
Fancy	6.25 to 6.50
Linen Cuttings—	
American	8.00 to 8.50
White	14.50 to 15.50
Grey	13.50 to 14.50

RAGS (Domestic)

OLD RAGS

Quotations to consuming mills, dollars per hundred pounds, f.o.b. New York, follow:

	per cwt.
Roofing—	
No. 1	1.25 to 1.30
No. 2	1.15 to 1.20
No. 3 and No. 4	.95 to 1.05
Twos and Blues—	
Repacked	3.00 to 3.25
Thirds and Blues—	
Repacked	2.85 to 3.00
Miscellaneous	2.25 to 2.50
Whites, No. 1—	
Repacked	4.75 to 5.00
Miscellaneous	4.00 to 4.25
White, No. 2—	
Repacked	3.50 to 3.75
Miscellaneous	2.75 to 3.00

RAGS (Foreign)

ex dock New York City

NEW RAGS

	per cwt.
New Dark Cuttings	Nominal
New Mixed Cuttings	
New Light Silesias	
Light Flannelettes	
Unbleached Cuttings	
New White Cuttings	
New Light Oxfords	
New Light Prints	

RAGS (Foreign)

ex dock New York City

OLD RAGS

	per cwt.
No. 1 White Linens	Nominal
No. 2 White Linens	
No. 3 White Linens	
No. 4 White Linens	
No. 1 White Cottons	
No. 2 White Cottons	
No. 3 White Cottons	
No. 4 White Cottons	
Extra Light Prints	
Ord. Light Prints	
Med. Light Prints	
Dutch Blue Cottons	
French Blue Cottons	
French Blue Linens	
Checks and Blues	
Linsey Garments	
Dark Cottons	
Old Shoppers	

ROPE and BAGGING

f.o.b. and ex dock New York City

	per cwt.
Gunny No. 1—	
Foreign	Nominal
Domestic	8.50 to 9.00
Wool Tares—	
Light	8.00 to 8.50
Heavy	8.50 to 9.00
No. 1 Scrap Bagging	7.25 to 7.75
Manila Rope—	
No. 1 large	6.00 to 6.25
No. 1 small	5.00 to 5.25
Sisal Rope—	
No. 1 large	5.50 to 5.75
No. 1 small	5.00 to 5.25
New Burlap Cuttings	8.50 to 9.00
Jute Threads—	
Foreign (Nom.)	6.50 to 7.00
Domestic	6.00 to 6.50
Strings—	
No. 1 sisal	5.00 to 5.25
No. 2 sisal	4.50 to 4.75
Soft jute	4.25 to 4.50
Mixed	2.50 to 2.75

WASTE PAPER

The following are quotations, dollars per ton, for No. 1 packing f.o.b. New York:

	per ton
Shavings—	
Hard White Env. Cuts	100.00 to 110.00
Hard White, No. 1	80.00 to 85.00
Soft White No. 1	60.00 to 65.00
Soft White, One-cut	90.00 to 95.00
Soft White, Misc.	45.00 to 50.00
Fly Leaf, No. 1	40.00 to 45.00
Fly Leaf, Woody, No. 1	30.00 to 35.00
No. 2 Mixed Col. Woody	20.00 to 25.00
Flat Stock—	
No. 1 Heavy Books and Magazines	19.00 to 20.00
Mixed Books	14.00 to 15.00
Ledger Stock—	
No. 1 White	40.00 to 45.00
No. 1 Mixed (Colored)	30.00 to 35.00
Manilas—	
New Env. Cuttings	60.00 to 65.00
New Env. Cuts, One-Cut	—
Extra Manilas	—
Manila Tab Cards, Free of Ground Wood	60.00 to 65.00
Colored Manila Tab Cards	40.00 to 45.00
Kraft—	
New Envelope Cuttings	65.00 to 70.00
Tripled Sorted No. 1 100%	35.00 to 40.00
New 100% Cor. Cuts	35.00 to 40.00
No. 1 Old Assorted	25.00 to 27.50
News—	
White Blank	70.00 to 75.00
Overissue	18.00 to 19.00
No. 1 Baled	14.00 to 15.00
Old Corrugated Containers	14.00 to 15.00
New Jute Corrugated Cuts	20.00 to 21.00
Mill Wrappers	8.00 to 9.00
Box Board Chips	6.00 to 7.00
No. 1 Mixed Paper	6.00 to 7.00

CHEMICALS

f.o.b. shipping point

Alum (Papermakers)—	
Lump, cwt.	4.05—
Ground, cwt.	3.80—
Powdered, cwt.	4.20—
Blanc Fixe—	
Pulp, bulk, ton	77.50—
Dry, barrels	85.00—
Bleaching Powder—	
Drums, cwt.	3.25 to 4.25
Casein (Domestic Standard)	
20-30 mesh (bags), lb.	
80-100 mesh (bags), lb.	30.00 to 31.00
Argentine, lb.	36.00 to 37.00
China Clay—	
Domestic Filler Bulk (mine) ton	10.00 to 15.00
Domestic Coating Bulk (mine) ton	15.00 to 25.00
Imported (ship side) Bulk (lump) ton	22.00 to 30.00
Chlorine—	
Tank cars (wks) cwt.	2.40 to 2.70
Gelatine (silicin), lb.	1.25 to 1.35
Glyc. (C.P.) drums, lb.	.39½ to .40
Litharge, powd., bbl. lb.	.23 to .24
Rosin (Gum)—	
New York, per 100 lbs.	
E	8.35—
F	8.50—
G	8.70—
WW	8.95—
Rosin (Wood), carlots	7.20—
Salt Cake—	
Dom. bulk (wks) ton	24.00 to 28.00
Imp. bulks on dock—(Atl. ports) ton (Nom.)	25.00 to ——
Soda Ash—	
Bulk (works), cwt.	1.10 to 1.20
Paper Bags, cwt.	1.30 to 1.40
Barrels, cwt.	1.70 to 1.8
Soda (Caustic)—	
Solid drums, cwt.	2.90 to 3.10
Ground or flake, drums, cwt.	3.25 to 3.50
Sodium Silicate—	
60 deg., 55 gal. drums, (works) cwt.	1.65 to 2.05
40 deg., 55 gal. drums, (works), cwt.	.80 to 1.45
Starch—	
Pearl, 140 lb. bags, cwt.	5.41—
Pearl, barrels, cwt.	5.41—
Paper, (Sp.) bags, cwt.	5.41—
Powdered, barrels, cwt.	5.52—
Sulphur (Crude)	
(Mine) bulk, long ton	16.00 to 18.00
Talc—	
Dom. 100 lb. bags (mine) ton	22.00 to 28.00
Canadian	35.00 to 45.00
Titanium Dioxide—	
Barium Pig, bbls., lb.	18 to .18½
Calcium Pig, bbls., lb.	18 to .18½
Zinc Sulphide, bbls., lb.	11.50 to 11.75

WOOD PULP

Prices, dollars per short, air dry, ton, on dock American ports and f.o.b. shipping points with former OPA freight allowances, are:

Bleached sulphite, Swedish	165.00—
Bleached sulphite, Finnish	165.00—
Bleached sulphite, dom.	126.00 to 135.00
Easy bleaching sulphite	—
Unbleached sulphite, Swed.	140.00 to 143.00
Unbleached sulphite, Fin.	140.00 to 143.0
Unbleached sulp'ite, dom.	118.00 to 130.00
Unbleached kraft, Swedish	127.50—
Unbleached kraft, Finn.	127.50—
Unbleached kraft, northern	115.00 to 125.00
Unbleached kraft, southern	105.00 to 120.00
Bleached sulphate, Swedish	165.00—
Bleached soda, domestic	130.00 to 135.00
Sulphite screenings, dom.	40.00 to 50.0
Sulphate screenings, dom.	40.00 to 50.0
Groundwood, domestic and Canadian	80.00 to 85.00

PAPER

f.o.b. New York City

Boards—	per ton
Binders	94.00—
Chip	85.00—
Chip, tube and can	90.00—
Chip, full blending	92.50—
Chip, sgl. mia. lined	90.00—
Coated, white patent .016	120.00—
.020 and heavier	110.00—
Kraft liner	79.00—
Filled News	90.00—
Container	90.00—

Book Papers—f.o.b. mill with quantity, weight, manufacturing and other differentials allowed:

(Per cwt. in ton lots)
Uncoated (Untrimmed)

Book, White (M. F.)—	
A Grade E. F.	14.85—
B Grade E. F.	14.55—
A Grade S. C.	15.35—
B Grade S. C.	14.95—
No. 2 Uncoated Offset 4 sides. White	—
Machine Coated White (Trimmed 4 sides)	
No. 1 Glossy	20.15—
No. 2 Glossy	18.90—
No. 3 Glossy	18.25—
No. 4 Glossy	—
No. 2 Offset	14.60—
C1S Litho (Varnish)	—
C1S Litho (Non-Varnish)	—

Writing Papers—f.o.b. mill with zone, quantity, packing and other differentials allowed:

Rag Content Bond—	per cwt.
(In Ton Lots)	
Extra 100% Rag	52.30—
100% Rag	46.35—
75% Rag	38.70—
50% Rag	29.50—
25% Rag	26.35—

Rag Content Ledger—	per cwt.
(In Ton Lots)	
Extra 100% Rag	50.50—
100% Rag	44.50—
75% Rag	36.70—
50% Rag	29.50—
25% Rag	26.25—
Sulphite Bond—	per cwt
Air dry, watermarked	—
No. 1 watermarked	18.50—
No. 2 watermarked	17.55—
No. 4 watermarked	16.35—
Sulphite Ledger—	per cwt. Zone 1
No. 1 watermarked	18.85—
No. 2 watermarked	18.05—
No. 4 watermarked	17.35—
Glassine (f.o.b. mill)—	per cwt.
Embossed (35 lbs. up)	—
Bleached (25 lb. up)	—
Unbleached (25 lb. up)	—
Greaseproof— Bleached (25 lb. up)	—
Unbleached (25 lb. up)	—
News—	per ton
Rolls, Standard (Contract)	100.00 to 103.00
Rolls (Spot)	(Nominal)
Sheets	119.00—
Tissues (Carlots)—	per ream
White No. 1	1.85—
White No. 2	1.75—
Bleached Anti-Tarnish	—
Colored	—
Anti-Tarnish Kraft	1.85—
Manila	1.60—
Napkins, semi-crepe (12½ lb. to M shts.) per cs.	.80—
Napkins, full crepe and emb'sed (12½ lb. to M shts.) per cs.	.80—
Toilet, Bleached (M. shts.) per cs.	8.75 to 10.00
Toilet, Unbleached (M. shts.) per cs.	7.50 to 10.00
Towels—	per case
Bleached	4.75—
Unbleached	4.00—
Wrappings (Kraft)—	per cwt
Super-Standard	9.00 to—
No. 1 Wrapping	7.50 to 8.00
Standard Wrapping	7.00 to 7.25
Standard Bag	6.50 to 7.00
Variety Bag	—
Wrappings (Sulphite and Bleached Kraft)— (Rolls, f.o.b. mill)	
Bleached Papers—	per cwt.
M.F. & M.G. Waxing, 20 lb. (Carloads only (10,000 lbs.)	—
Drug wrapp., 35 lb.	—
Unbleached Papers—	
Com. Gr. Butch. 40 lb.	—
No. 1 Butchers	—
No. 1 Imit. Parch & Dry Fin. Groc. Sulphite, 30 lb.	—
No. 2 Imit. Parch & Dry Fin. Groc. Sulphite, 30 lb.	—
Steam Finish, 50 lb.	—
Water Finish, 50 lb.	—
Manilas—	
Envp. Mfg., Sub. 16-40 (No. 1)	—
Envp. Mfg., Sub. 16-28 (No. 2)	—
Envp. Mfg. (Prices based on large sheets untrim'd ream-marked, in bdls.)	
Wrapp. Mfg. 35 lb. up—	
No. 1	—
No. 2	—
M.G. Sulphite and Kraft (other than Waxing)	
Grade B30 lb.	—
Grade A-22 lb.	—

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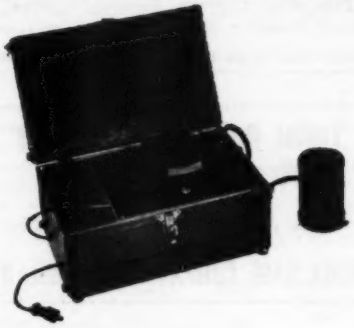

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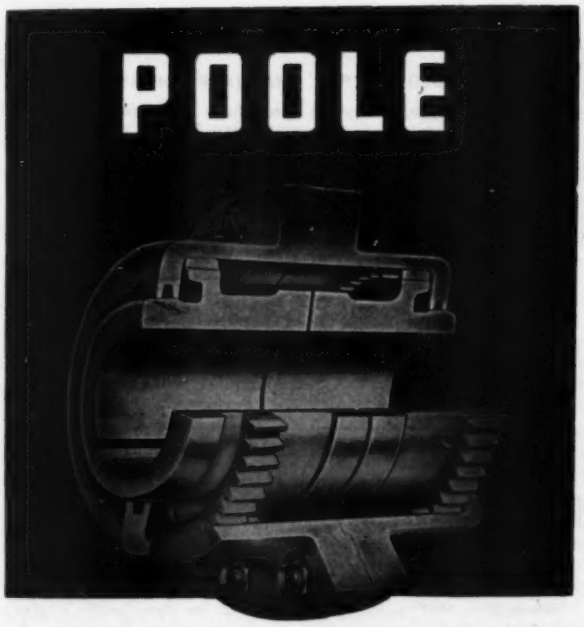

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ROGERS TYPE "NT"
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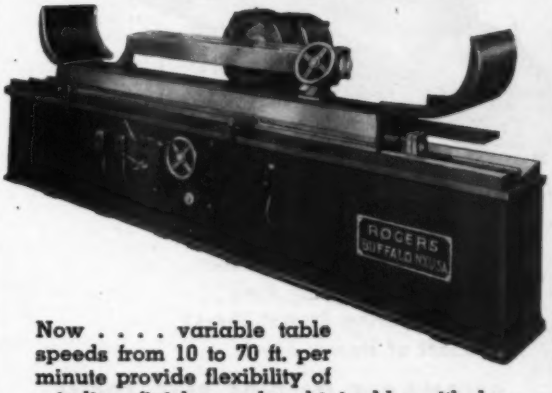

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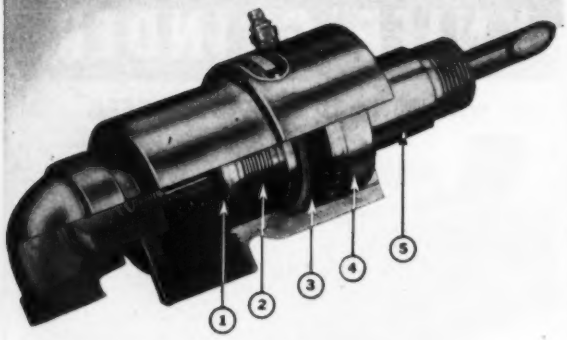

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3—Graphite Sealing Ring
4—Ball Bearing Radial Thrust
5—Shaft of Heavy Steel

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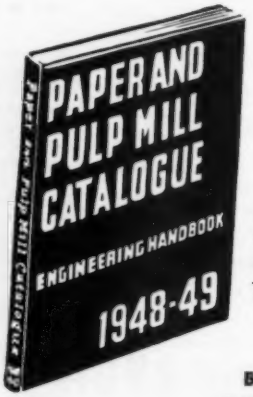

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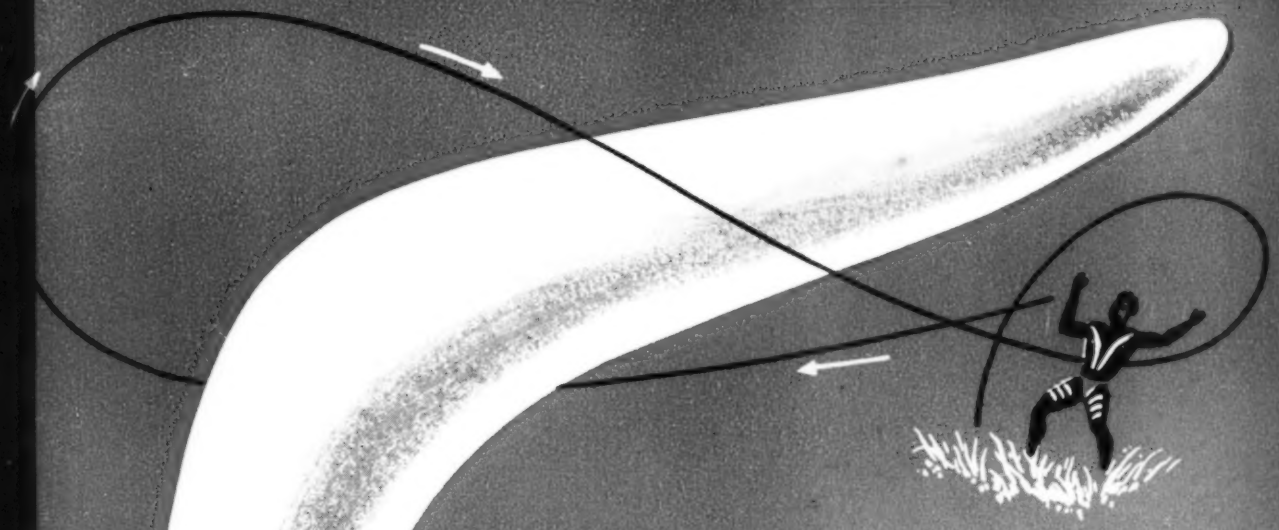
boomerang: a piece of flat, curved wood which when thrown returns to the thrower.



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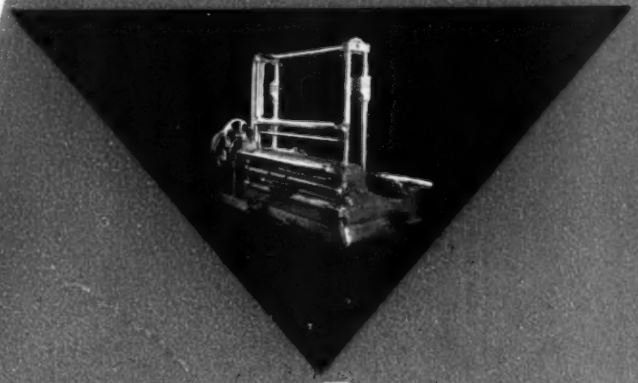

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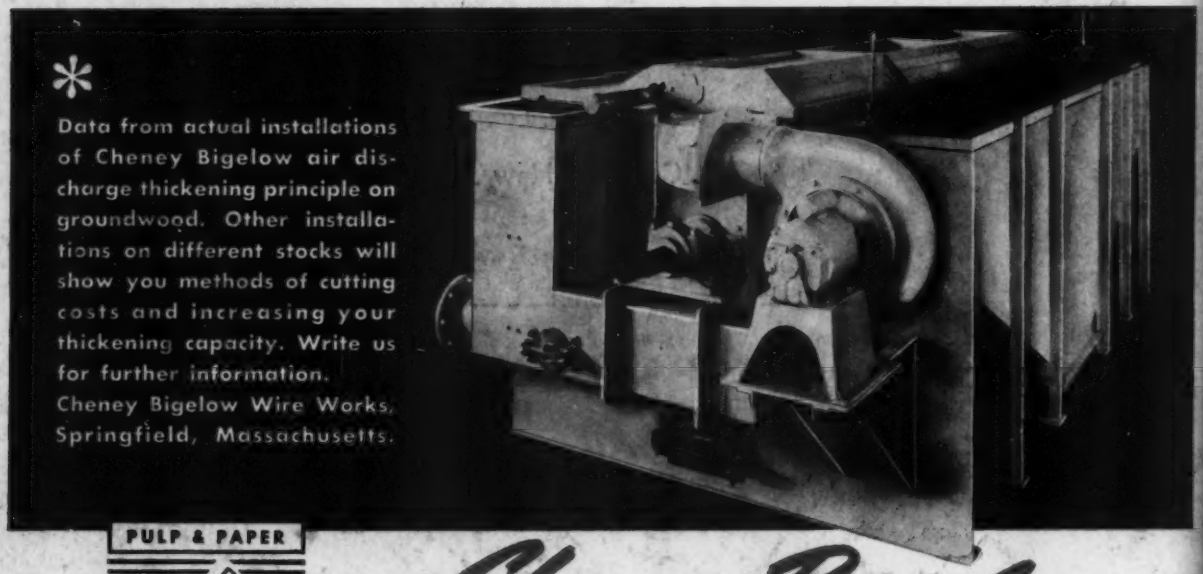

* Data from actual installations of Cheney Bigelow air discharge thickening principle on groundwood. Other installations on different stocks will show you methods of cutting costs and increasing your thickening capacity. Write us for further information. Cheney Bigelow Wire Works, Springfield, Massachusetts.

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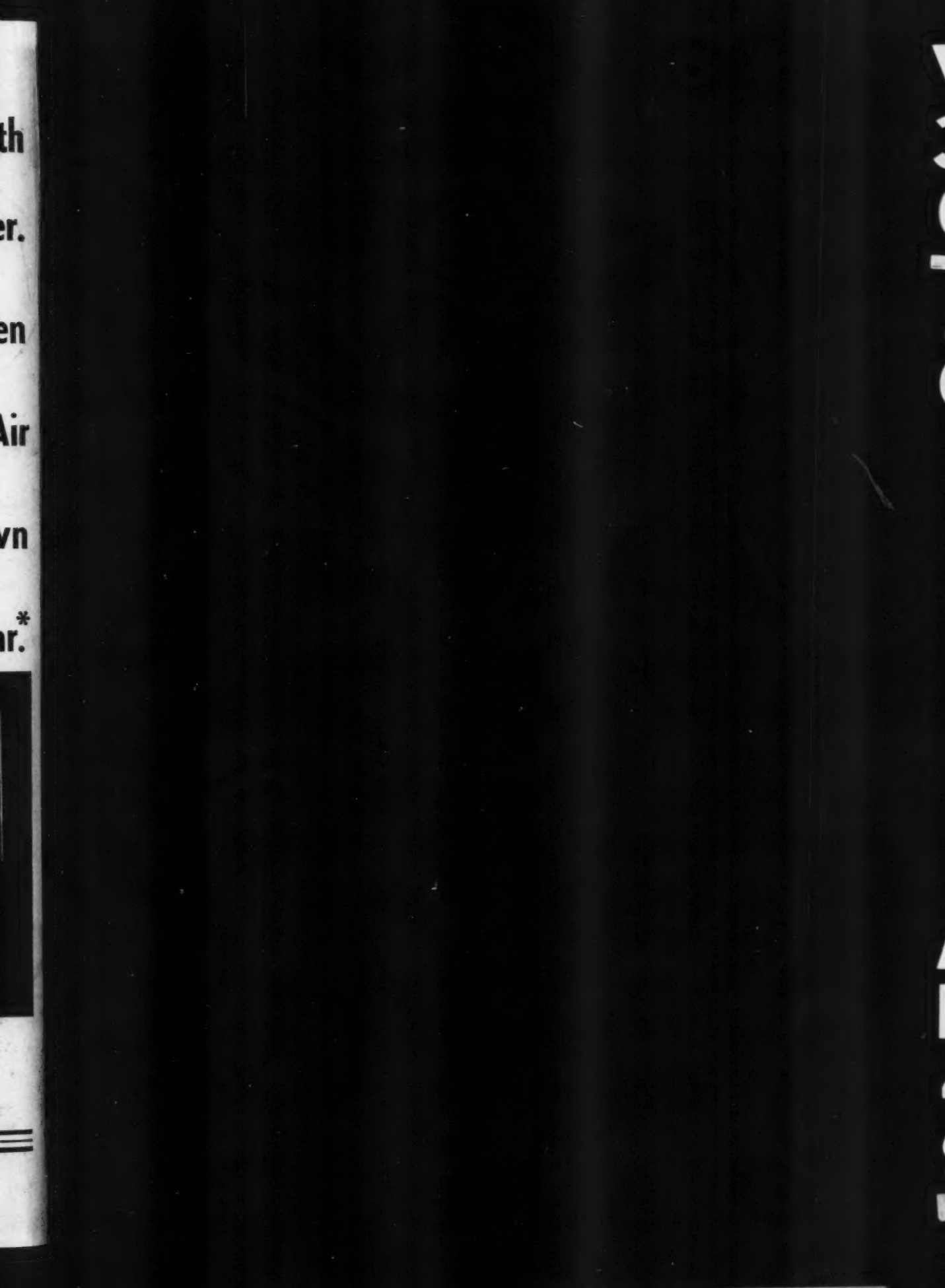
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